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Vol. 53, No. 1 March, 1972
(New Series)

THE WISCONSIN ARCHEOLOGIST

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WISCONSIN ARCHEOLOGICAL SOCIETY

Milwaukee, Wisconsin

Incorporated, 1903

For the purpose of advancing the study and preservation of Wisconsin Indian Antiquities

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All communications in regard to the Wisconsin Archeological Society and contributions to the Wisconsin Archeologist should be addressed to Mrs. Edward Flaherty, Secretary, N62-W15127 Tepee Ct., Menomonee Falls, Wis. 53051. Entered as Second Class Matter at the Post Office at Lake Mills, Wis., under the Act of August 21, 1912. Office of Publication, 316 N. Main St., Lake Mills Wis. 53551.

THE WISCONSIN ARCHEOLOGIST

New Series

MILWAUKEE, WISCONSIN - MARCH, 1972

Published Quarterly by The Wisconsin Archeological Society

THE MOLASH CREEK RED OCHER BURIAL

John R. Halsey
State Historical Society of Wisconsin

Although the Molash Creek burial first came to light March 20, 1898 and was mentioned in print soon after (Hamilton, 1898) and has subsequently been referred to in numerous publications (Brown, 1905; Brown, 1907; Brown, 1915; Falge, 1915; Brown, 1940; Quimby, 1958; Faulkner, 1962; and Ritzenthaler and Quimby, 1962), it has never been adequately described and the references listed above merely mention the numbers of artifacts and the types of artifacts found. These artifacts presently constitute part of the large collection donated to the State Historical Society of Wisconsin by the noted collector and industrialist, Henry Pierpont. Hamilton, of Two Rivers, Wisconsin.

Hamilton describes the finding of this burial as follows:

> . . .It was on this site, four miles north of the city limits (Two Rivers) that this discovery was made. Two boys were walking over the tract looking for relics and one of them stepped on a heap of flint disks but slightly covered, and the rubbing of the flints attracted his attention, when an examination was made. One hundred disks from two to four inches long were taken out of this deposit, and one large flint, shown in the center of the cut, is ten and a fourth inches long and most beautifully made. This was all that was discovered on that day, and the boys returned to the city without having extended their investigation further, as they had no tools with them for digging. On the next day they returned to the place with shovels, and after sinking a trench about two feet in depth they came to an ocherous deposit about three inches thick of a reddish brown color. In this there were small fragments of bones badly

> decayed which crumbled to small particles when exposed to the atmosphere. . . .The ocherous deposit mentioned above was of considerable extent, but I have not been able to ascertain its nature. It had stained most of the disks with its own color. The human bones imbedded in it had so far decayed that I was unable to preserve any of them; but a careful examination at the time of their discovery might have resulted in better success. Unfortunately the deposit was uncovered in a careless and hasty manner by the boys, who had no idea of the value of close observation; their only object being to secure relics (Hamilton, 1898, pp. 158-159).

The site was located in Section 29, R-25-E, T-20-N, Town of Two Rivers, Manitowoc County, Wisconsin. Quimby (1958, p. 176) states that the site was near the bank of Molash Creek about one-half mile from its mouth.

The most striking artifact in the Molash Creek find is a large bifacial blade (Plate 1A). This specimen is 259 mm. long, 39 mm. wide and 12 mm. thick. It is made on a pinkish-white flint that may actually be called flesh-colored. There is some purplish mottling toward the tip. Approximately one half of the blade has a different surface texture, although whether this is due to exposure and weathering in the burial or whether it was on the original nodule is uncertain. The presence of a fairly consistent ocher stain the length of the blade suggests that the latter is the case. The primary flaking is undistinguished and the secondary retouch gives the edges a somewhat serrated appearance. The tip terminates in a rather blunted point and the base is irregularly convex. This specimen does not appear to have been used as a tool.

A copper knife or spear point was also found in association with this burial (Plate 1 E). It is 134 mm. long, has a maximum width of 34.0 mm. and is 3 mm. thick. There are impressions of what appear to be animal fur preserved in the green copper salts. Also visible on the surface of the copper blade itself are small striae or scratches which tend to parallel the long axis of the blade. The tang of the blade is somewhat unusual. It represents 31 mm. of the total length of the implement. It has been battered on both edges and has a somewhat crudely

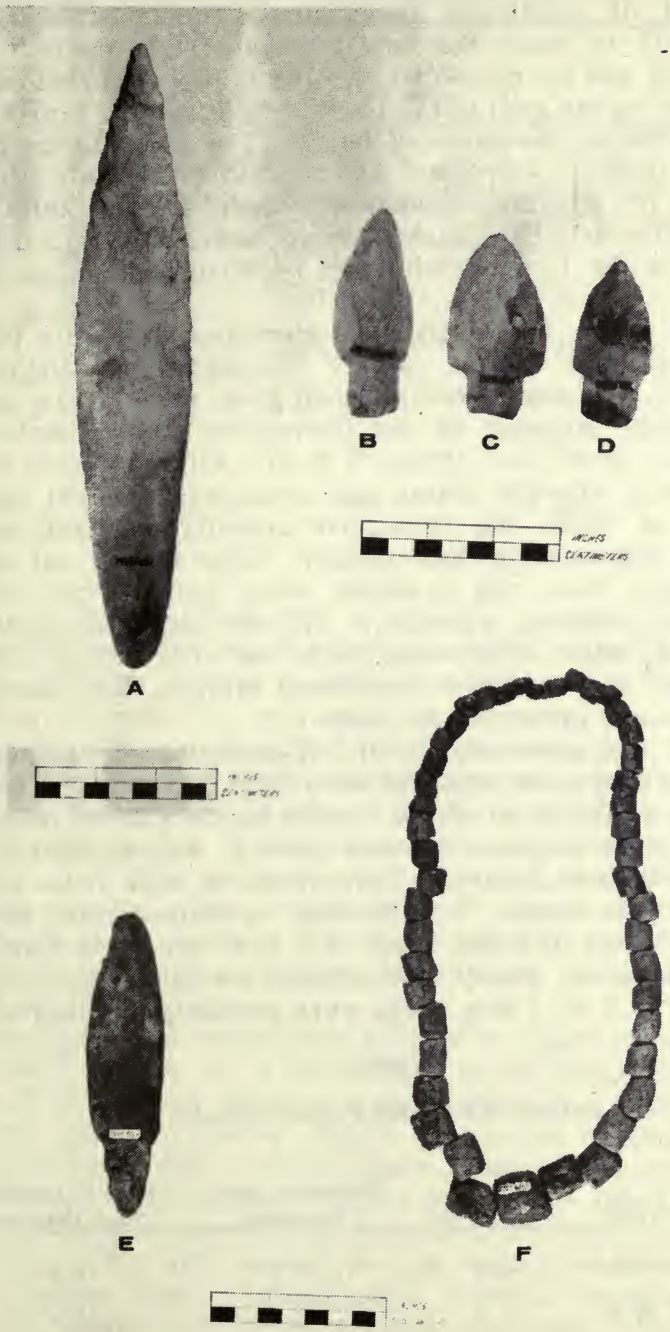

Plate 1.

serrated or scalloped appearance. This treatment was apparently to make the tang less mobile in the haft. The patination and corrosion on the tang is of a different nature than that on the rest of the blade indicating that it probably was hafted at the time of burial. The edges of the blade are too heavily corroded and eroded to indicate clearly whether or not this implement was used as a knife or a spear. This point or knife does not seem to be an example of any of the types established by Wittry (1957, pp. 214-215).

There were originally four stemmed projectile points found with the burial. Three of them are still in the collection, the fourth having been given many years ago to the geology museum of the University of Wisconsin and has since been lost (Plate 1 B-D). All three have ovate blades with straight stems and relatively straight bases. On two of them, the bases are actually remnants of the striking platform of the original flake blank. All three could have been and probably were made from ovate-triangular bifaces similar if not identical to those described below. They are made on chert which can be duplicated in the above-mentioned bifaces. The metrical attributes are presented in Table 1.

There are presently 46 of 110 copper beads originally found available for study (Plate 1 F). For some unknown reason a necklace of small copper beads was not included with the rest of the collection when it was donated to the State Historical Society. They range in size from 5.5 to 23.25 mm. in length, 7 to 21 mm. in diameter and have a wall thickness ranging from 1.5 to 8 mm. The majority are quite thick, heavy and crudely worked. Short strips of copper 1.5 to 4 mm. long were probably hammered out

Table 1

Metrics of Stemmed Projectile Points (mm.)

Length	Width	Thickness	Minimum Stem Diameter	Base to Minimum Stem Diameter
79.0	30.5	11.5	19.0	19.0
69.0	38.0	10.0	21.5	15.0
63.5	30.0	8.0	23.0	18.0

Table 2

Metrical Summary of Large Copper Beads (mm.)

	Length	Diameter	Thickness
N	46	46	46
Sx	591.75	551.59	128.25
Sx^2	8222.3125	6963.5017	392.8125
$\overline{X}$	12.86	11.99	2.79
s	3.66	2.76	.87
V	.285	.230	.311
Range	23.25-5.5	21.0-7.0	6.0-1.5

flat and then formed into a roughly cylindrical shape, frequently creating beads which have a hole with a triangular cross section. There is often a considerable amount of overlap between the two ends of the strip. It is difficult to say what the relationship between the two groups of beads (the large ones described here and the missing small ones) was, as there is no evidence in the original description specifically stating the spatial relationship between the two groups, if in fact there was one. It seems more likely that all the beads were originally part of one necklace. A summary of the metrics is presented in Table 2.

There was also a stone bead present in the original find but it too is missing.

There are 165 unstemmed bifaces exclusive of the large "dagger." There is a seemingly great diversity in the types of stone used, but this is an illusion. In a preliminary sorting attempt, twelve major categories of chert were distinguished, with twelve more represented by single specimens. This problem of the number of types present was further compounded by one specimen which contained as the matrix and inclusions, no less than three of the major stone types distinguished. Another limiting factor was the desirability of maintaining the ocher stain on the surface, as these were to be used in an exhibit on "Red Ocher" cache blades. Most of the stone appears to be derived from small nodules or pebbles probably obtained

from the beach. This material is generally gray to light grayish green in color and some of it is banded in concentric rings. Much of the material appears to be cortical in nature rather than good "solid" chert. This is another confusing factor since the texture of the chert from the interior and that from the exterior of a nodule may be quite different. There is only one "foreign" piece in the whole series. This particular specimen is made of what appears to be Indiana hornstone, a fine gray, homogeneous flint found in southern Indiana and other areas along the Ohio River. The hornstone itself is present on only one end of the artifact and the rest is a much lighter gray chert, entirely different in appearance.

For descriptive purposes, these 165 bifaces have been divided into three groups: (I-) bipointed ellipsoidal (Plate 2 A-H); (II-) ovate triangular with convex base (Plate 2 I-P); (III-) ovate triangular with a more or less straight base (Plate 2 Q-Y).

Type I. As an average this group was longer, slenderer and thinner than the other two groups. There were 13 specimens, 7.9% of the total bifaces, in this category. The primary flaking is quite crude on all of these specimens and in most cases the only secondary retouch is confined to the very edge. On three specimens, the only chipping done on the ventral surface of the flake was to remove the positive bulb of percussion created when the flake was removed from the core. The flake-blank orientation appeared to be proximal or distal rather than oblique or transverse (Binford, 1963). All seem to have been used.

Type II. This group is the most numerous of the three containing 116 of the 165 total bifaces or 70.3%. These are typically slightly less than twice as long as they are wide with a convex base and generally convex sides. Twenty-four of these have remnants of the striking platform for the flake blank still visible and it is invariably at the basal end either directly in line with the long axis of the flake or off to one side slightly near one of the rounded corners of the base. Usually only primary flaking is present. Nearly all of these appear to have been utilized as tools. Some were apparently hafted, pointed end first with the base being used as the working edge of a scraper. In this process small flakes were removed from the "up" or dorsal side of the tool. Others show use as knives and scrapers. A frequent

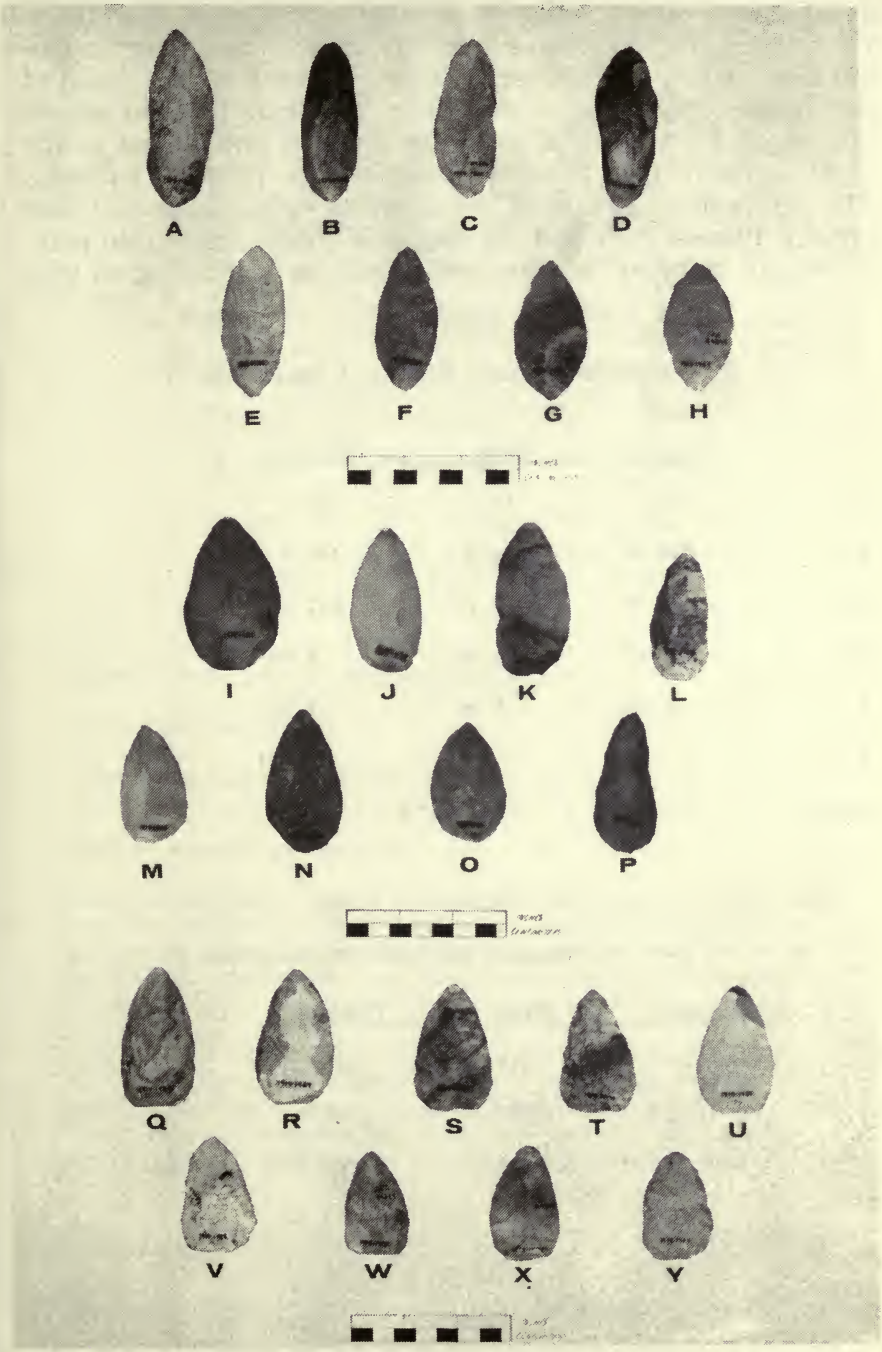

Plate 2.

use pattern noted here is a series of small use flakes removed along one edge, usually toward the base on one surface. When the reverse side of the tool is looked at the usage chips are in the same position. In other words the edges have been alternately utilized and flaked in the same manner that creates beveled-edge projectile points. The implement was used for a while on one edge and then simply flipped over and the opposite side brought into play. A lesser number of the tools show use chipping on both

Table 3

Metrical Summary for Type I Bifaces (mm.)

	Length	Width	Thickness
N	13	13	13
Sx	848.0	370.5	108.0
Sx^2	55827.0	10682.75	927.0
$\overline{X}$	65.23	28.50	8.31
s	6.27	3.08	1.50
V	.096	.108	.181
Range	73.0 - 57.0	33.0 - 24.0	11.0 - 7.0

Table 4

Metrical Summary for Type II Bifaces (mm.)

	Length	Width	Thickness
N	116	116	116
Sx	7494.0	3892.0	1048.5
Sx^2	490761.5	132072.5	9662.75
$\overline{X}$	64.60	33.55	9.04
s	7.58	3.60	1.25
V	.117	.107	.138
Range	92.5 - 48.5	47.0 - 28.0	12.5 - 6.0

Table 5

Metrical Summary for Type III Bifaces (mm.)

	Length	Width	Thickness
N	36	36	36
Sx	2143.5	1203.0	305.5
Sx^2	129018.25	40641.0	2642.25
$\overline{X}$	59.54	33.42	8.49
s	6.23	3.46	1.14
V	.105	.104	.134
Range	70.0 - 45.5	41.0 - 28.5	12.0 - 7.0

N = Sample size or total number of specimens.

Sx = Total of measurements.

Sx^2 = Total of the squares of individual measurements.

$\overline{X}$ = Mean or average measurement.

s = Standard deviation. This is a statistical term indicating that under a normal distribution curve roughly two-thirds of the specimens will fall within one standard deviation on either side of the mean. Fox example, taking the width category for Type I bifaces, 8 of the 13 specimens fall between 9.81 mm. and 6.81 mm.

V = Coefficient of Variability. This shows the size of the standard deviation relative to the mean. In other words, again taking Type I bifaces as an example, even though length has a much larger standard deviation than thickness, the attribute of length shows relatively less variability than does thickness.

sides of one edge or with all use chips on one side of the biface.

Type III. Type III is not much different than Type II except that it has a more or less straight base. There are 36 of these (21.8%). Fifteen have a portion of the bulb of percussion present at the base of the artifact. These bulb remnants are positioned exactly like those of Type II and

in several cases they comprise the entire base. These also bear the same usage marks as noted for Type II. Metrical summaries for all three types are presented in Tables 3-5.

DISCUSSION

The Molash Creek burial was included by Ritzenthaler and Quimby in their 1962 definition of the Red Ocher Culture and was even called "typical" (p. 256) although it lacked one of the three distinctive nuclear traits, turkey-tail blades. Nevertheless it does contain five of the seven major nuclear traits, lacking in addition to the turkey-tails only tubular marine shell beads. As it is not my purpose to undertake another major survey or updating of the Red Ocher Culture, my remarks will be fairly short.

The large blade generally conforms quite well to the description given by Ritzenthaler and Quimby (p. 247) but it is the slenderest of any of those observed in the literature and is slightly below the average length for this class of artifacts.

The copper knife or spear point is one of three reported for Red Ocher sites in Wisconsin. The Molash Creek specimen is the smallest of the three in all dimensions. Quimby (1957, p. 3) noted that the copper blade from Port Washington fit none of the established categories of Old Copper implements although he goes on to say that this form has been found with typical Old Copper specimens at two sites (unnamed) in Michigan. The Molash Creek specimen is similar to that from Port Washington and also does not fall into any of the Old Copper types and would seem to be distinctive of Red Ocher although obviously descended from Old Copper.

The large copper beads are quite similar to those described from Carey (Brown, 1916), Thiensville (Ritzenthaler and Niehoff, 1958), Stoughton (Brown, 1916), Peterson (Faulkner, 1960), Morse (Morse, 1959), Banner (Morse, 1959), Dyer (Quimby, 1960), Sny-Magill Mound 43 (Beaubien, 1953) and Harpers Ferry (Beaubien, 1953). Almost identical beads are found in Glacial Kame burials such as the Zimmerman site, the Burch site (Cunningham, 1948), and several lots which I have seen in the Ohio State Museum from sites in Ohio.

The ovate-trianguloid blades can only generally be compared with those from other Red Ocher sites as there is usually only a tabulation of the number present with no metrical information beyond general size range. Bearing this in mind, a survey of the literature indicates that the Molash Creek population of blades has a larger range of sizes and is on the average larger than any other group. Only the quartzite blades from Port Washington approximate this size range. The only reports having any comparable metrical data are those of Binford (1963 and 1963a) concerning caches from Michigan. Once again these prove to be considerably smaller than the Molash Creek specimens and have a smaller range of variation in all dimensions.

The stemmed projectile points are fairly indicative of a Late Archaic-Early Woodland time horizon and appear rather similar to those from the Red Ocher type site F • 11 in Fulton County, Illinois (Cole and Deuel, 1937, Fig. 19), and those illustrated by Quimby (1957, Fig. 2). They are virtually identical to those illustrated by Morse (1959, Fig. 5) and Beaubien (1953, Fig. 21, c,f). A stemmed point or drill was present in an elaborate Red Ocher burial from Empire Township, Fond du Lac County (Rueping, 1944, p. 14 and Ritzenthaler, 1965, p. 145) and a large stemmed point, 8 1/2 inches long is reported from the Whitefish Bay site in Door County (Brown, 1907, p. 62; Brown, 1924, p. 70; Schumacher, 1918, p. 141).

Since projectile points, stemmed and notched, occur at as many of the type sites used by Ritzenthaler and Quimby (1962) as do large ceremonial flint knives and occur at more sites than do worked copper, tubular marine shell beads and all of the peripheral traits listed by Ritzenthaler and Quimby, it would seem prudent to consider them more closely in future analyses of the Red Ocher Culture.

The dating of this site was discussed previously by Quimby (1958) and he came to the conclusion that it belonged in the time period between 900 B.C. and 400 B.C. At the present time there seems to be no new evidence suggesting a date other than in this time span.

The purpose of this brief article was to describe in detail the artifacts discovered in a Red Ocher Culture burial discovered in 1898 and to provide a comparison with some similar artifacts from elsewhere in the state of Wisconsin and also Illinois and Indiana. Even though it contained

nothing really unusual I think it is important that every such find be reported in as great detail as possible to facilitate future syntheses of the Late Archaic-Early Woodland time level in the Midwest.

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THE POPE SITE
A SCOTTSBLUFF CREMATION? IN WAUPACA COUNTY

Robert Ritzenthaler
Milwaukee Public Museum

In January of 1972 Mr. Paul E. Pope brought to the museum a collection of projectile points and fragments found on his farm over the years. The site is located in Waupaca County, Lind Township, Section 17, N.E. 1/4, about 5 miles south of the city of Waupaca. All the material, except for one chert Agate Basin point, is quartzite and all was recovered from either the surface or plow zone in what is described on the soil maps as Manawa sandy loam. All the recognizable fragments and points are Paleo-Indian dating from about 6500 to 4000 B.C. All of the specimens brought to the museum, except for the Agate Basin point, were found in the spring of 1971, and most occurred in an area two feet square.

The specimens can be grouped into three categories. First is what I shall call the cremation represented by five very broken examples of the eared variety of the Scottsbluff point (Fig. 1). This type with straight or slightly expanding stem and basal projections has thus far been reported only for the Great Lakes area and has been referred to as the "Scottsbluff-Eared" variety (Ritzenthaler, 1971:15). Of some interest is the size with the largest being about 7 1/4 inches in length (a small section of the body and tip is missing, but this is the minimal dimension), considerably larger than the Plains varieties.

They have a lanceolate body, are lenticular in cross-

Figure 1. Fire-cracked Spear Points. Scottsbluff Eared Variety

section, and are characterized by parallel flaking and secondary retouching. The flaking is oblique-transverse (v-shaped) starting from the tip, but flattens out to the horizontal by mid-body and continues so. The base and stem edges are heavily ground.

None of the five are complete, but are fire-cracked

Figure 2. Fire-cracked Fragments

fragments glued together by the finder who collected the pieces after considerable sifting of the soil in an area "about the size of a dining room table top." The pieces were discolored by the fire, and the breakage is mostly transverse. The large specimen was in nine pieces, two of which are missing. There were also fire-cracked quartzite fragments from five other points (Fig. 2). Technologically they represent Scottsbluff, and the one base fragment is of the Scottsbluff Eared variety. They must be considered part of the crematory inventory.

That this probably represents a cremation (although no bone was reported) is based on Mason's finds of 1959 at the Renier Site in Brown County, about 70 miles distant. Here was found the remains of a small crematorium containing fragments of Scottsbluff and Eden points of quartzite cracked by thermal action and tiny fragments of calcined bone in insufficient amount for radiocarbon dating, but identifiable as representing one person, probably an adolescent (Mason, 1960:44-45). Eden bases were not recovered, but using a combination of flaking pattern and indices, particularly thickness-width, Mason deduced that two of the twelve recognizable points were Eden. Of the ten Scottsbluff where bases were recovered all were of the Scottsbluff II type thus different from the Eared variety at the Pope Site, although it should be noted that this is a slight morphological distinction and in technology, type of flaking, and edge-grinding the two types are identical. Mason

Figure 3. Scottsbluff 11 Variety

suggested an age of 6500 to 4000 B.C. for the burial, based on dates obtained from sites bearing comparable cultural material occurring on the Plains, and such a dating would apply to the Pope Site.

The second category of finds from the Pope Site consists of two complete Scottsbluff II points (Fig. 3). They are made of a fine-grained Hixton Silicified Sandstone. The source of which is Silver Mound, Jackson County, Wisconsin (Porter 1961). Utilizing a better grade of the same material used in the crematorium pieces. They are also small, the largest being 3 7/8th inches in length. The other specimen is inordinately wide for a Scottsbluff, but in all other ways fits the type. The base and edges of the expanding stems are ground. They are from the same area as the crematorium, but untouched by fire and in perfect condition.

Finally, Mr. Pope reports a surface find of another Paleo-Indian point on his land, but in a different field and across the Walla Walla River. It is a small (2 7/8 inches) chert Agate Basin variety with heavily ground edges from the base to over half way up the body (Fig. 4).

The Pope Site along with Renier Site are important landmarks in the early prehistory of Wisconsin. We particularly wish to thank Mr. Paul E. Pope for reporting his finds, and Dr. Marshall O. Boudry of Waupaca who was an important catalyst in the reporting.

Figure 4. Agate Basin Point

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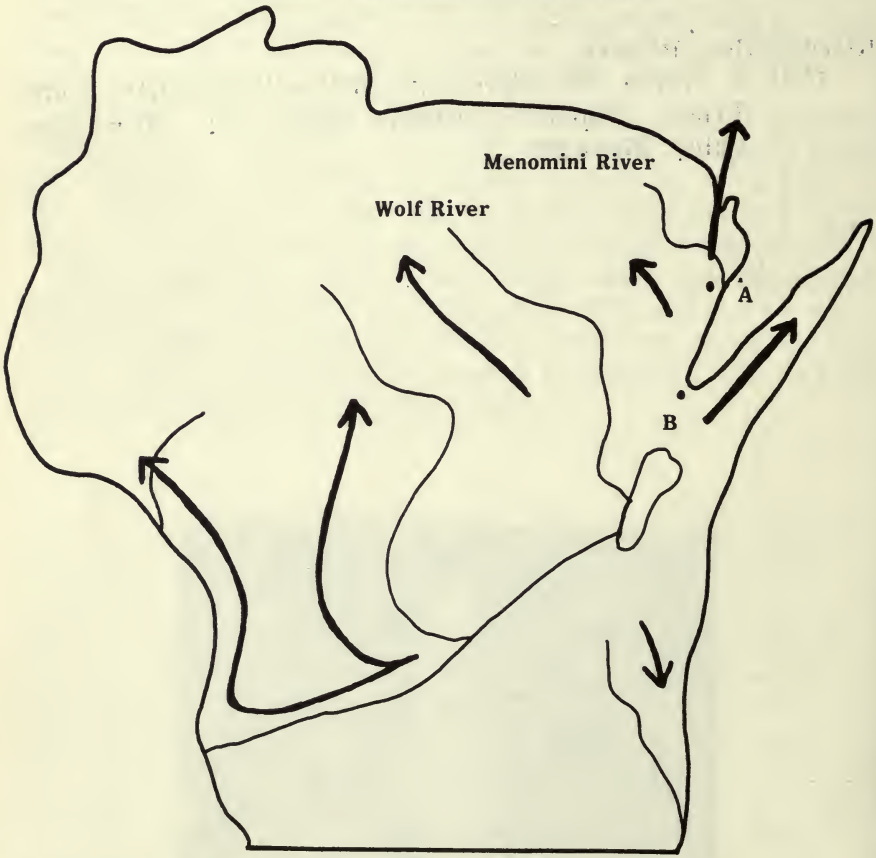
THE INFLUENCE OF THE CLIMATE OF THE 1820'S AND 1830'S ON THE COLLAPSE OF THE MENOMINI FUR TRADE

Sharon Hastenrath
Department of Anthropology
University of Wisconsin, Madison

History of the Menomini Fur Trade

Figure 1. The Menomini in Wisconsin.



A - Ancestral Village, 1660 - 1740
B - New Village, 1740 - 1780

Arrows indicate travel routes of the bands to the winter hunting grounds.

For a long period before the White Man came, the Menomini occupied the area west of Lake Michigan in the vicinity of Green Bay, gathering wild rice in the fields, and fishing and hunting in the winter (Keesing, 1939). In 1668, Perrot and other traders brought the first cargo of goods into the area to barter for furs, attempting to make La Baye a trade center. The traders wanted winter pelts and, according to Keesing, induced inland winter movement of the sedentary Menomini for the purpose of extensive winter hunts. Figure 1 shows the location of the Menomini villages and the major routes followed by them on the winter hunts.

For the first century, until 1760, the fur trade was under French influence. In 1678, they sent explorer-exploiters into the region to winter with the Indians for trade purposes, making unnecessary the long journeys of the Indians to distant trade settlements. The traders encouraged them to hunt furbearing animals, particularly beaver, and La Baye became a main trade center.

In 1696 (Keesing, 1939) a change of policy greatly affected the Menomini fur trade. French anti-imperialists felt that the trade was ruining the Indians through the distribution of brandy and the relations of the traders with Indian women. This was coupled with declining demand for fur in Europe and within two years, posts were evacuated and trading licenses revoked. A few years later increased demand resulted in the return of the French, but now with concentration on a few strategic points near agricultural colonies of the Whites. After 1716, the Menomini region became a rallying point for traders and a fort was built at Green Bay.

From 1759 until 1815, however, as a result of General Wolfe's victory over the French at Quebec, the British rather than the French controlled the region and its trade. The region changed hands again in 1794 by way of a British-American treaty, becoming part of the United States. The British, though, did not withdraw until 1815, during the richest time of the fur trade activity. During the 15 years of direct American control (1815-1830) the British trade was still very well established. In 1800 the American Fur Company was established but could not compete with British and French rivals. The American government's attempt to control the fur trade by establishing a trading

post was a failure, but laws enacted by Congress (Keesing, 1939), forbidding foreign traders, began to ruin the British and French influence around 1821.

After this time, the trade began to decline. Letters of local residents in 1820 and 1824 mention the declining business. In the 1830's, the economy collapsed and the fur trade era came to an end. The Menomini began to rely on agriculture and timber, instead of on the fur trade and the hunt.

Keesing suggests that over-exploitation of the resources led to the collapse (Keesing, 1939). As the game became depleted near the Menomini villages, the hunting routes supposedly extended farther and farther inland, until the over-exploitation led to a rapid decline of trade. Baerreis (1970) suggested that this picture may not be complete, that environmental stress and climate change around 1830 may have had a profound effect on the decline of the fur trade. That hypothesis is explored in this paper.

Global Climatic Change

There is much evidence to indicate that the 1830's were a period of significant climate change. Lamb (1968) refers to the period of about 1430 to 1830 as the Little Ice Age. After about 1830 a warming trend began which lasted until about 1950, the onset of the warming trend varying over the globe.

During the Little Ice Age (Lamb, 1968), the glaciers of Europe reached their most advanced position since the Wisconsin Ice Age; polar ice in the Atlantic was more extensive than ever before in historic times. Recession of the ice followed after 1800 - 1830 until about 1900 or later, moving the rain zone and depression tracks farther north.

While 1790 - 1830 stands out as a period of minimum strength of zonal circulation in January (Lamb, 1968), the 1830's were a period of increasing westerlies, with a subsequent temperature rise beginning in Europe. The decade 1830 - 1839 stands out meteorologically from all others between 1750 and 1930 for a number of other reasons, being the time of the most northerly position of the high pressure belt over Europe and the Mediterranean, of large tem-

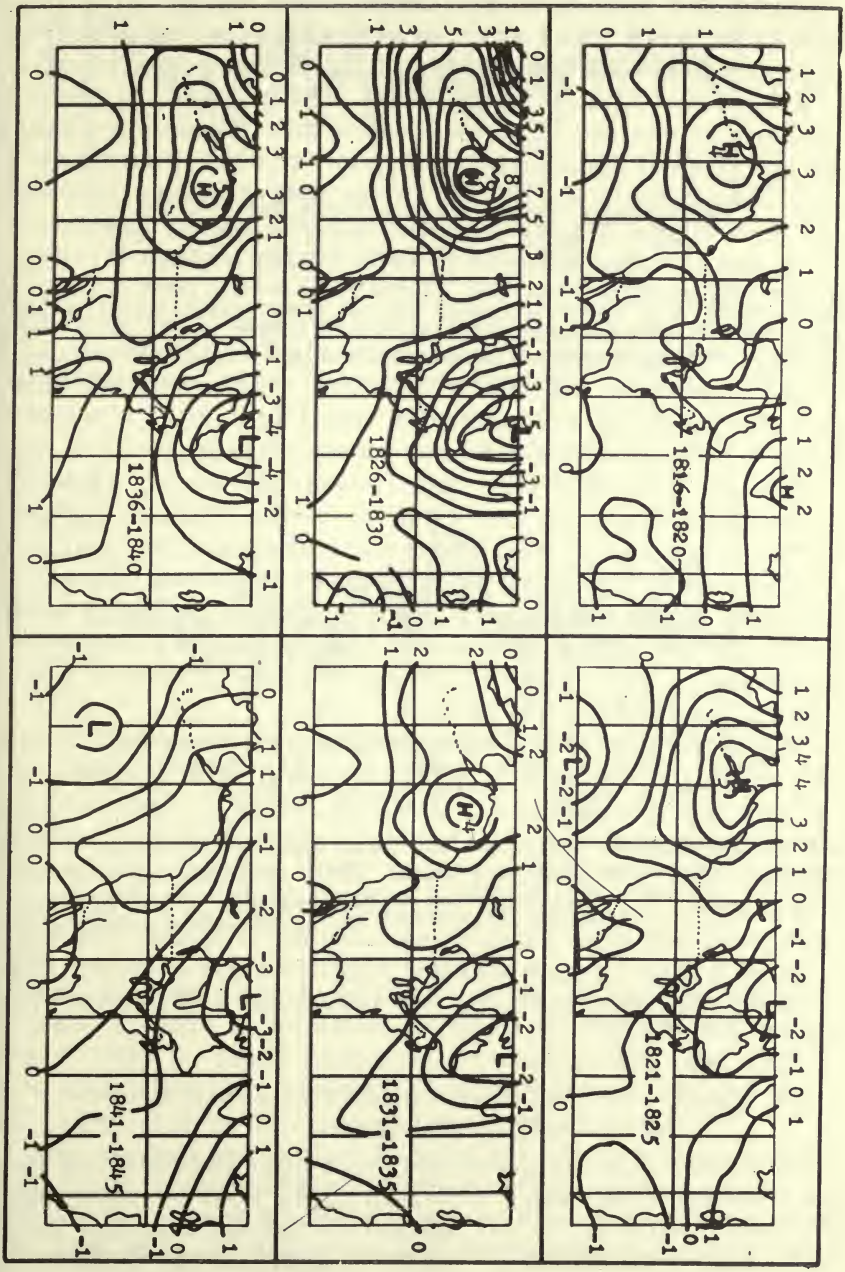


Figure 2. January through March pressure anomalies from A.D. 1816 - 1845 expressed in millibars and averaged by pentads as specified from anomalies in tree growth. (from Fritts, etal, 1970)

perature and pressure anomalies over the earth, strong trades, blocking highs over Scandinavia, and the break-up of Arctic ice and the inflow of the ice into the Atlantic.

Tree-ring data (Fritts, et al, 1970) used to derive pressure anomalies (Figure 2) show this change very well, and are in good agreement with Lamb's (1968) statement of large anomalies in the 1830's. Fritts' data, however, indicate that in northeastern North America the strong anomalies are in the periods 1826-30 and 1836-40, rather than throughout the whole 1830's decade. During these two periods there is an extensive low anomaly centered east of Hudson Bay, implying stronger than normal northerly flow into Wisconsin. In other periods for which data are given (between 1721 and 1945), positive and generally small anomalies are more common here. Only 1886-90 has an anomaly pattern similar to 1826-30 and 1836-40; this period (Rosendal, 1970, b) is also recognized as one of large-scale climatic change.

The relevance of this large-scale climatic data may not be immediately apparent, but the data do serve two purposes. The first is to suggest that any apparent change in local data is probably real, not merely due to random fluctuation, and probably quite significant since global changes would imply fairly strong local shifts.

Secondly, data from Wisconsin extends back only to the 1820's and can be easily compared with later periods but not with earlier periods. Greatest support for climatic effects on the fur trade decline would be established by showing that the period around 1830 is significantly different from both earlier periods and the later periods, which tend towards warmer and milder climate. The data on large-scale climate change support such a trend, with the Little Ice Age reaching its maximum intensity around 1830.

Climate of the Eastern United States, the Midwest, and Wisconsin

Two sets of more localized data also indicate that the years around 1830 were different from both previous and subsequent periods. The first set of data is from the East Coast of the United States, shown in figures 3 and 4 (Landsberg, 1970): annual temperatures and precipitation totals. The temperatures seem to reach a minimum in the 1830's, with only the 1770's being as cool. A distinct warming trend

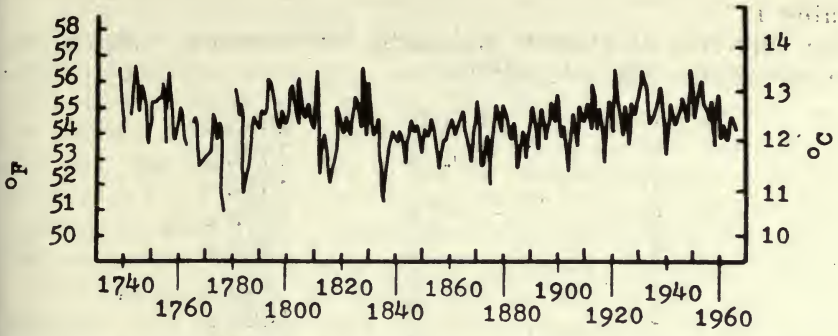


Figure 3. Annual temperatures for the eastern seaboard of the United States for the period 1738 - 1967 - a representative, reconstructed synthetic series centered on Philadelphia (from Landsberg et al, 1968: copyright 1970 by the American Association for the Advancement of Science)

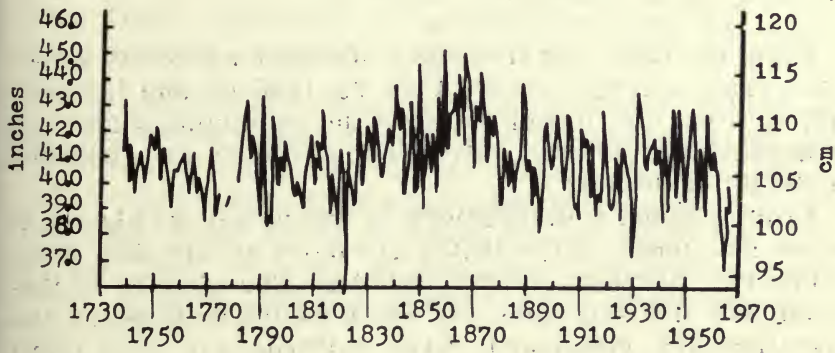


Figure 4. Annual precipitation totals for the eastern seaboard of the United States for the period 1738 - 1967 - a representative, reconstructed synthetic series centered on Philadelphia (from Landsberg et al, 1968: copyright 1970 by the American Association for the Advancement of Science)

begins about this time. In figure 4, the 1820's, rather than the 1830's, have a minimum of precipitation for the entire period 1738 - 1967, indicating that perhaps the 1820's were also a period of climatic stress. More localized data, discussed later in this paper, tend to support this.

The second set of data is very general and here will be considered qualitatively. Ludlum (1966, 1968) gives an account of extreme winters in the United States between 1604 and 1870. The record for the Midwest extends from 1775 to 1870. He classifies them as severe or mild, with the number by decade given in Table 1.

Table 1
The number of severe and mild Midwestern winters per decade from 1770's to 1860's

# Severe	# Mild	Decade
1	0	1770's
1	5	1780's
3	5	1790's
4	3	1800's
1	2	1810's
2	4	1820's
5	2	1830's
1	0	1840's
2	0	1850's
1	0	1860's

From the table, the frequency of severe winters is shown to be greatest in the decades 1790-99, 1800-09, and 1830-39. With the first two, though, most of the remaining winters of the decade are mild, but only two mild winters are recorded for the latter decade.

From Ludlum's discussions of individual winters, it seems that those of the 1830's are more severe than those of the two previous severe decades. The winters of this decade are the only ones for which deaths by freezing and starvation are mentioned. Crop failures are also more frequently mentioned for this decade. The winter of 1830-31 was extremely cold and snowy. Winter of 1831-32 was one of the coldest ever, with the temperatures at Green Bay remaining below freezing from November 27th to January 7th. February of 1835 was the time of the Great Arctic Outbreak, with readings of 0 F recorded at the Gulf and South Atlantic Coasts, this occurring only twice in the entire 19th century. Several records were set during the February outbreak. At Fort Snelling (Minnesota), 8 consecutive mornings had temperature readings below 0° F, and -30° F was recorded in Wisconsin with high winds. Many people were frozen in Illinois, and presumably other areas as well, as the outbreak was very sudden. One man's eye was frozen, and papers in a newspaper press room were frozen into a solid block. The winter of 1835-36 was mentioned as a time of great starvation, with winter setting in in Michigan in November, when

cattle should have been grazing. There was extreme snow depth, long ice duration, and a temperature of -40° F was recorded at Sault Ste. Marie. The change in December was so sudden that a chicken was reportedly frozen standing on one leg, the temperature dropping instantaneously from the 40's to 0° F. People were reported frozen, some to their saddles as they rode. Winds were also quite high, increasing the severity. The winter of 1837-38 was also quite severe.

Wisconsin tends to follow the pattern of the rest of the Midwest, but specific data are also available from Wisconsin starting around 1820. Wahl (1968) compares the 1830's in the eastern United States with current normals and gives special attention to the Wisconsin data. He concludes that Wisconsin winters are warmer now than during the 1830's, after which time a warming trend began in the northern United States, primarily in the Midwest, with the largest change being in early fall.

Wahl explains the change by more frequent and probably more persistent influx of polar air into the Midwest, leading to prolonged buildup of cold anticyclones in the early fall season. Accompanying precipitation changes were higher precipitation over the cold area in the earlier period, which fits well with the idea of frequent cold outbreaks from Canada, causing frequent showers as it meets the warm, moist Gulf air.

During the 1830's, the late fall precipitation was above the current normal across southern Illinois and Kentucky, and cold air outbreaks must have extended more to the south to increase shower activity here, with accompanying cyclones extending farther south.

Rain to the north would be decreased. This change can also be understood in terms of the polar front. In current data rainfall in Wisconsin has a definite peak in June with a secondary maximum in August; in the data of the 1830's, the peak is in July with no secondary peak. In the 1830's, the mean summer position of the Polar Front went through Wisconsin in July at its most northward position, but currently the July position is as far north as Lake Superior and Wisconsin has rainfall peaks as the front passes through the state northward and southward. This is consistent with Lamb's suggestion that in the 1830's the rain zone and depression tracks were farther south than in later years.

Data from Fort Howard, near the Menomini Villages

From meteorological records, much data is available over Wisconsin to compare the 1830's with later years, but only a few years of records are kept before this. The primary sources of data are military records: the surgeon at each army post kept a weather log of temperatures; days of snow, rain, and cloudiness; and wind direction. Precipitation measurements were included after 1836. Data became available (Lawson, 1840, 1851) from Fort Howard near Green Bay and the Menomini villages in 1822. Lawson's data were used in figures 5 - 7, showing yearly, monthly, and winter temperature averages; monthly minimums; and monthly frequencies of precipitation days for Fort Howard.

In figure 5, the severity of the winters at Fort Howard in the period 1829-38 is readily observed. The period is much different from that of 1822-28. The average of the average temperatures of each year's coldest month is 15.7 for the earlier period, and 13.4 for the later period; but perhaps more significant is that the variance of temperatures of the year's coldest month is considerably greater for the later period. Standard deviations are 3.4 and 6.0 respectively. For the modern period 1965-70, standard deviations for the same data are 2.3 for Shawano (also near the villages) and 3.5 for Green Bay. This would indicate extreme variability of the winter climate there during the period 1829-38. The average winter temperature (average of December, January, and February) is 19.5 and 19.5 for the periods 1822-28 and 1829-38; this difference is certainly not significant.

It seems, then, that the main difference between these two early periods is the rapid fluctuation between extremes in the later period. Each winter of 1822-28 has generally three cold months, with little difference between December, January, and February, and with only two months of the entire seven year period averaging below 15° F. In the period 1829-38, nine months of the ten years average below 15° F, but for most winters there is one, possibly two, very cold months with others much warmer, or four uniformly cold months. The minimum temperature for each month, in figure 6, also illustrates the severity of the winters, correlating well with the data in figure 5.

The data for Fort Winnebago and Wisconsin overall

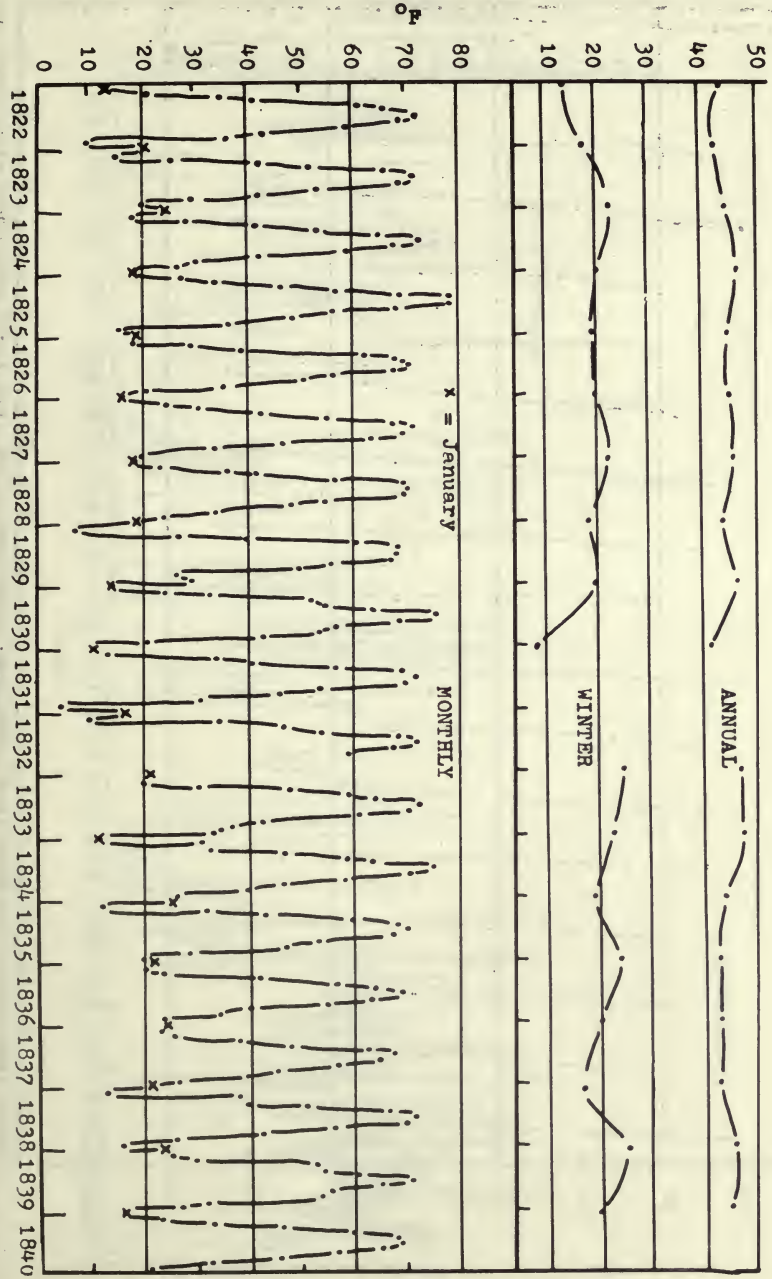


Figure 5. Average temperatures at Fort Howard.

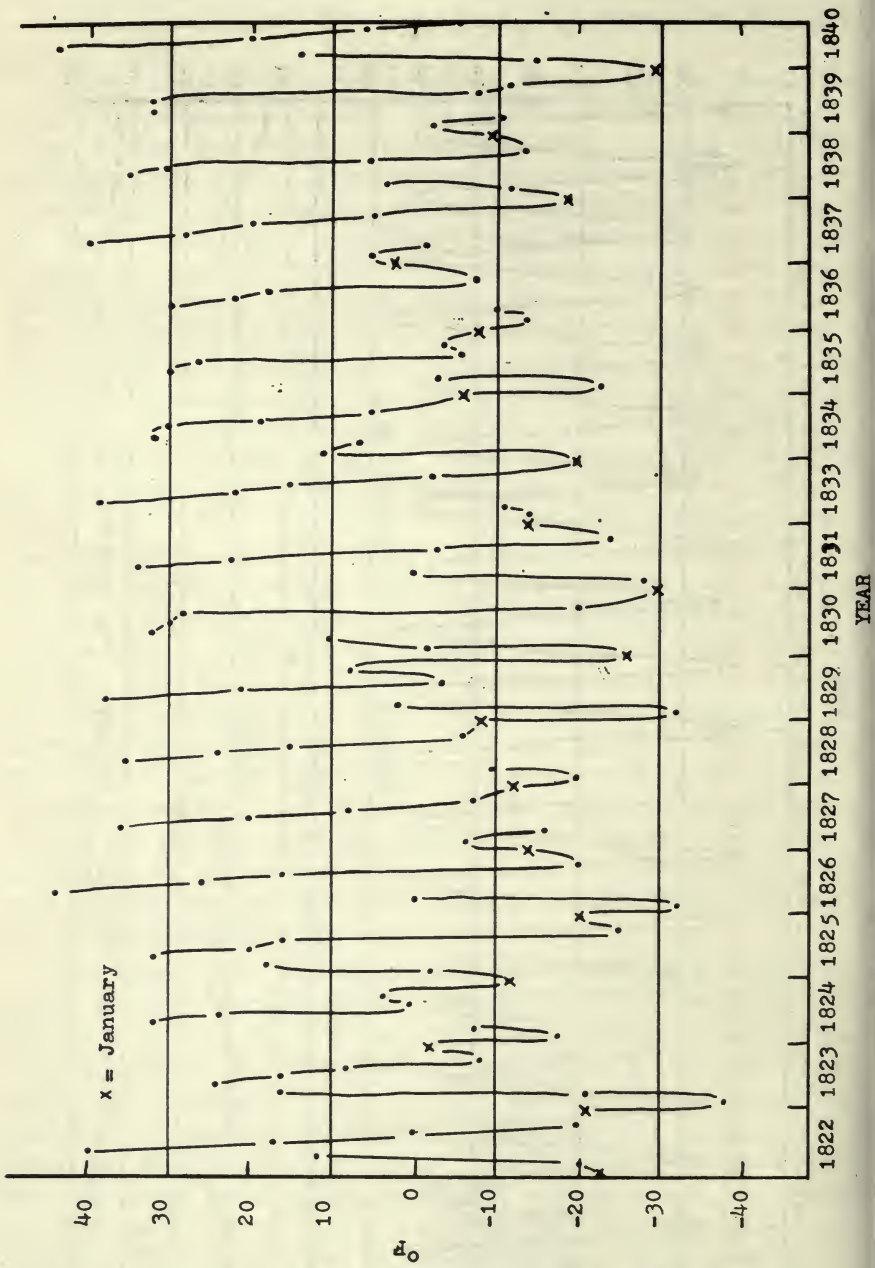
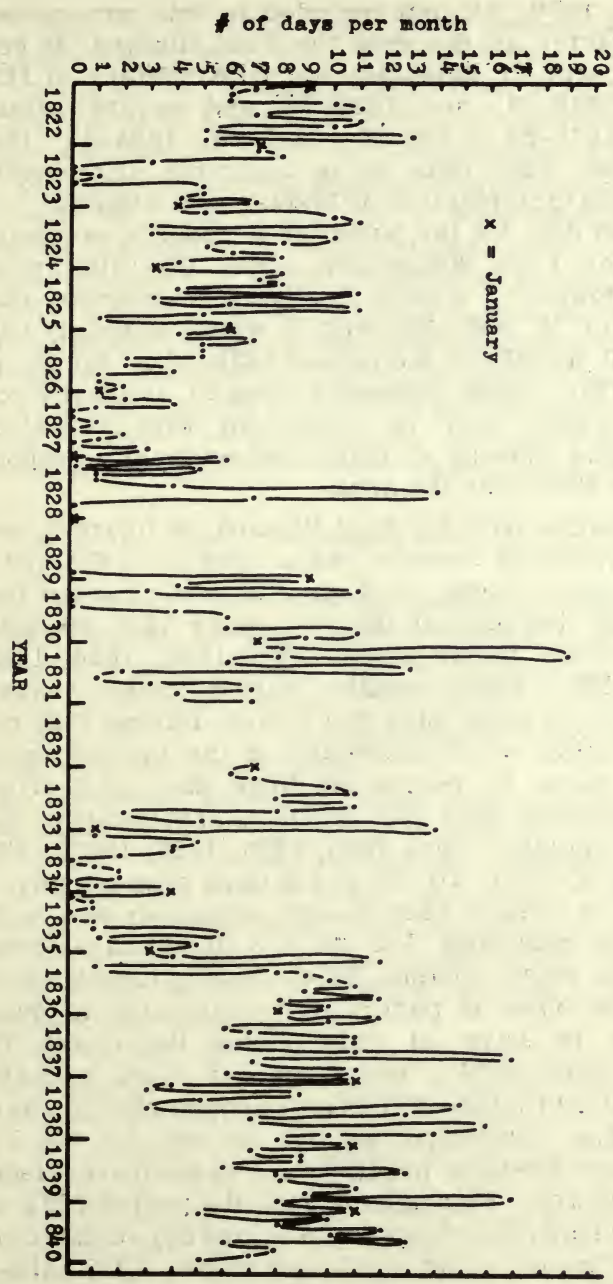


Figure 6. Minimum temperature for the month, September to April (Fort Howard)



igure 7. Frequency of days in each month with either rain or snow. (Fort
oward)

(Rosendal, 1970, a), not included in this paper, have the same character as the data for Fort Howard. In general, the three sets of data indicate mild winters of 1824-25, 1829-30, 1832-33, and 1833-34; and severe winters of 1822-23, 1828-29, 1830-31, 1831-32, 1834-35, 1835-36, and 1837-38. This data is in complete agreement with Ludlum's characterization of Midwestern winters.

The wind data for the period is not nearly so conclusive, as it is for Fort Winnebago, about 90 miles from Fort Howard. However, Wahl's (1968) data indicate that the frequency of N, NW, NE, and E winds is nearly twice as great in all months of the period 1829-38 as for the period 1931-48. This would suggest a greater influx of cold air into the region, and is consistent with Fritts' (1970) tree-ring data showing an increased northerly component of geostrophic flow over the area.

Precipitation data for Fort Howard, in figure 7, indicate severe dryness in several years between 1822 and 1840, with the 1830's being perhaps the one of more frequent precipitation because of the wet years 1836-39. Extreme dryness occurs in the years 1823, 1826, 1834, 1835, and perhaps 1829. Many months during these years have precipitation on fewer than three days. During 1829 no days of precipitation were mentioned in the log for the entire year, but there is reason to doubt this, as nearby forts recorded several days per month of precipitation. Particularly dry summers were 1823, 1826, 1827, 1830, 1834, and 1835, with 6, 9, 1, 10, 3, and 2 days respectively. Comparatively, the years 1836-40 are extremely wet, with rain or snow on generally 1/2 or 1/3 of the days being very common for many months. An extremely high frequency of precipitation days is particularly noticeable in March of 1831, with 19 days of rain during the month. This is consistent with Wahl's hypothesis of more southerly extension of cold outbreaks and more southerly cyclone paths, both receding northward toward the end of the 1830's, bringing more frequent precipitation to northern Wisconsin.

Other notable extremes during the period 1822-40 are the unprecedently hot (Lawson, 1940) and dry summer months of 1830 in Wisconsin and to a lesser extent, 1825. Also to be considered is the frequency of September and May frosts, as indicated by the occurrence of temperatures below 32°F. Such temperatures occur in September of 1823, 1825, 1826,

1830, 1834, 1835, 1836, and 1839, and in May of 1827, 1824, 1825, 1828, 1823, 1836, 1839, and 1840.

In general, the climatic data thus establish that the 1830's seem to be a period of nearly global climatic change and are extremely anomalous when compared with modern data. But, Midwestern and Wisconsin data indicate that in this area both the 1820's and 1830's were fairly severe and extremely variable. In both of these decades there is an abundance of severe winters rapidly alternating with a few intensely mild winters. Such climatic instability can create many hardships on a culture intimately associated with its environment. Because of the rapid fluctuation, the people have no stable pattern to which an adjustment can be made, and adaptation to new conditions is extremely difficult. This is perhaps more critical than a mere change of conditions.

Early Menomini Economy

The Menomini were a people intimately associated with the environment, as will be seen from the description of the wild-rice gathering, and their economy was extremely sensitive to climate change. Therefore, the climate of the 1820's and 1830's may have had more of an effect on them than is generally acknowledged.

The Menomini economy of the pre-contact period was based primarily on wild rice gathering and hunting. Indian corn, squash, beans, tobacco, acorns, and wild plants were also used but the rice was the main staple; without it the people starved (Jenks, 1901). Various small game and birds were hunted for food, such as heron, quail, ducks, geese, teal, and other waterfowl. Fishing was also a large part of the subsistence (Keesing, 1939).

In the spring, the Menomini had maple sugar and fish; and the summer, fish and game; in the fall, wild rice and corn; and in the winter, fish and game. When fur trading came in, it was carried on through extensive hunts in the winter months, so as not to interfere with the food cycle of gathering, gardening, rice harvesting, and so forth.

The wild rice, according to Jenks (1901), is the most critical resource. Without it, the Indians faced starvation. Not only the Menomini, but also the traders in the area, depended on it. Without the fish and rice, which the Indians sold to the traders, the traders could not subsist in the

area. Additionally, the birds and waterfowl feed on the wild rice, utilizing fallen grain that was useless to the Indians. Failure of the rice crop meant loss of these valuable resources as well.

The grain of the wild rice is shed into the water of lakes, rivers, and ponds, growing in the shallow areas of these, and lies in the soft ooze of alluvial mud at the bottom until spring when it germinates and grows rapidly to the surface. Early in June a shoot appears at the water surface and blossoms; the seed matures in late August or early September. Both men and women gathered the rice, often into the month of October.

Jenks makes frequent reference to crop failures and the sensitivity of the rice crop. In some areas the crop failed as often as one in three years. He states that the natural enemies are anything which destroys seeds, even after they are mature and ready to grow. But, destruction of a plant is more serious as each plant produces about 100 offspring. Floods and high water drown the plants; young plants are killed by frost; and storms disperse the grain into the water, where it cannot be gathered, and destroy green stalks by bending.

Many of the references to crop failure and sensitivity were made in the 1890's, at which time climatic conditions were warmer and drier than in the 1830's and perhaps more stable. This being the case, one would expect even more frequent failures during the earlier decade of severe stress. A number of references in the literature on the Menomini support this. Jenks (1901) mentions that there were larger yields before 1820, and quotes a farmer as saying in that year that the Menomini trade rice in the winter for trinkets and ornaments even at the cost of starving. Perhaps prior to that time they were generally accustomed to such an abundance of rice, which lasted until spring, that they could trade some of it. In 1835, a trader stated that game and rice were scarcer every year, that the Indians would be driven to the alternative of cultivating the land or perishing by famine. Keesing (1939) mentions that such a change to agriculture did occur in the 1830's and presents further evidence taken from letters of local residents. A letter of 1820 states that trade business was dull and that in January the Menomini were still waiting for the Bay to freeze to go on their hunt. The hunt

had been failing and fish could not be speared. In 1824, a letter mentioned that there was no hunt, with conditions worse than ever before. In February the winter was still so open and mild that the Bay had not frozen; no sturgeon could be speared. There was starving and famine, no ice in the Follavoine River, and few fish. The writer expressed concern over how the people would survive the winter.

The last evidence indicates that not only the wild rice, but the fishing as well, depends on climate. The fishing would be hindered by not only a late freeze (which would make the spearing of sturgeon impossible), but also by a late thaw, as the spring food cycle depended on fish runs before the winter food supply was used up.

The rice gathering would be particularly affected by hard rains, particularly in summer, extreme dryness which might dry up the rice paddies, early frosts, storms, and high winds. In turn, the rice crop failure leads to diminished numbers of birds and waterfowl, another source of food supply. Extreme summer dryness, as in 1823, 1826, 1827, 1830, 1834, 1835 and possibly 1829, might also destroy wild plants on which the Menomini depended in the summer. Additionally, cold fall temperatures decrease the length of the gathering season.

Both the 1820's and 1830's in Wisconsin appear from climatic records and historical accounts to be characterized by such disasters. If Green Bay were unfrozen in February of 1824, it was likely in the similar state in 1825, 1833, 1837, and perhaps in 1828 and 1836. The frequency of extremely dry and wet years during the period would also have had very negative effects. September and May frosts could have had disastrous effects on the rice in 1823, 1824, 1825, 1834, 1835, 1836, and 1839, as would the extreme cold of several of the winters.

Conclusions

The original hypothesis involved the influence of a climatic change around 1830 on the decline of the Menomini fur trade. No data are presented on direct effects, although two seem highly plausible. The first is the possibility of decreasing the number of game through starvation or other disasters, not at all unlikely in view of the climatic extremes at this time.

Secondly, the animals, if not killed by starvation and other disasters, may have been pushed farther south to warmer lands. This seems even more plausible when one considers that the region is the border of three culture areas - plains, Eastern woodland, and Northern woodland (Keesing, 1939) - and three vegetation complexes. Boundaries such as this are fairly sensitive to climate change.

More important, perhaps, is indirect influence with the conditions affecting the subsistence and health of the people first of all, and this contributing to the trade decline. The first such effect is that in years when food supply was short, all effort had to go into the subsistence activities. The trade was carried on through winter hunts, when the subsistence activities were at a minimum, so as not to interfere with the food cycle, and was thus secondary to these, the game having comparatively little food value. If crops failed, or the Bay was open and no fish speared, the effort had to be put forth to find food, rather than furs. The fact that in 1824 (as suggested in the letter Jenks refers to) there was no hunt because the lake did not freeze gives weight to this. The frozen bay had no direct bearing on commencement of the hunt, as it was not traversed to go to the main hunting grounds in figure 1.

Secondly, in years when the people faced starvation, they were perhaps unprepared both physiologically and in terms of supplies (such as food) for the hunt.

Finally, if crops and fishing were poor, it was suggested by Jenks, neither the Indians nor the traders could survive in the region. If the traders left, fur trade would collapse. The letter of 1824 gives weight to this possibility.

In view of these relationships, it seems that the climate change and climatic stress of the 1820's and 1830's may have profoundly influenced the decline of the fur trade. Strong evidence is available for such disasters as crop failures, diminished fish and bird resources, freezing, and starvation. These in turn contributed to the decline of the fur trade, rather than over-exploitation, as suggested by Keesing.

This is not to say that climate change in itself brought the fur trade to an end. It is likely that a complex of factors (one being, perhaps, the controversy over which country had rights to the trade) affected the trade. However, the effect of climate on the collapse of the fur trade should certainly be considered.

In conclusion, a second point may also be made. Jenks (1901) utilizes the same sort of over-exploitation hypothesis to explain an apparent population decrease of the Menomini between 1778 and 1822, suggesting over-exploitation of wild rice. This is highly unlikely for two reasons. First, the rice is an annual plant, growing from seed and with each plant producing about 100 offspring. It is difficult to over-exploit such a crop. Secondly, Jenks mentions the frequent over-abundance of the crop in good years, with enough to feed many more thousands of people throughout the winter. This sort of crop is also unlikely to be over-exploited. Thus, if a population decrease was concurrent with the collapse of the fur trade, and had resulted from failure of the rice crop, the failure was most likely due to natural disasters and climate change rather than exploitation. This hypothesis, another case where the role of climate should not be overlooked, might be further pursued.

Acknowledgements

The author would like to thank Professor John E. Kutzbach for his valuable suggestions and criticisms during the preparation of this report and Professor David A. Baerreis for his original suggestion of the hypothesis.

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AN EIGHTEENTH CENTURY INDIAN SITE IN THE MICHIGAN UPPER PENINSULA

Robert Ritzenthaler
Milwaukee Public Museum

Historic Indian material was recovered by Mr. Louis Wessel of Cudahy during the summer of 1971. It was found in an embankment about one foot below the surface on the Presque Isle Camp Ground at the mouth of the Presque Isle River near the shore of Lake Superior in Gogebic County, Michigan. The specimens occurred in a concentration of ashes and tiny white seeds identified as probably pin cherry (prunus ponsylvanica). The specimens occurred pin cherry (prunus ponsylvanica). The specimens as shown in Figure 1 consist of: 1) a German silver brooch; 2) a strike-a-light; 3) fragments of a metal dish; 4) a gun flint; 5) comb fragment; 6) three shell hair-pipes; 7) six bird wing bone beads with incised line and dot designs; 8) a considerable quantity of small, white glass beads of which only a few are shown; 9) two thimble tinklers.

Of special interest are the incised bird bones assumed to have been used as beads, the largest of which is 3 3/4th inches in length. While they are in various states of fragmentation, all appear to have had double incised lines around the ends and center. On one, no further decoration is visible. One has a band of two incised lines filled in with incised dots running diagonally from each end to the center. The other three have a similar band running from one end to the center, but a band filled with incised lines running from center to the other end.

The specimens were donated to the Milwaukee Public Museum by Mr. Wessel.

Dr. Ronald Mason (personal communication) of Lawrence University suggests a dating between 1730 and 1780 based on comparisons with the Bell Site, Rock Island, Lasanen Site, Gros Cap, and Michilmackinac.

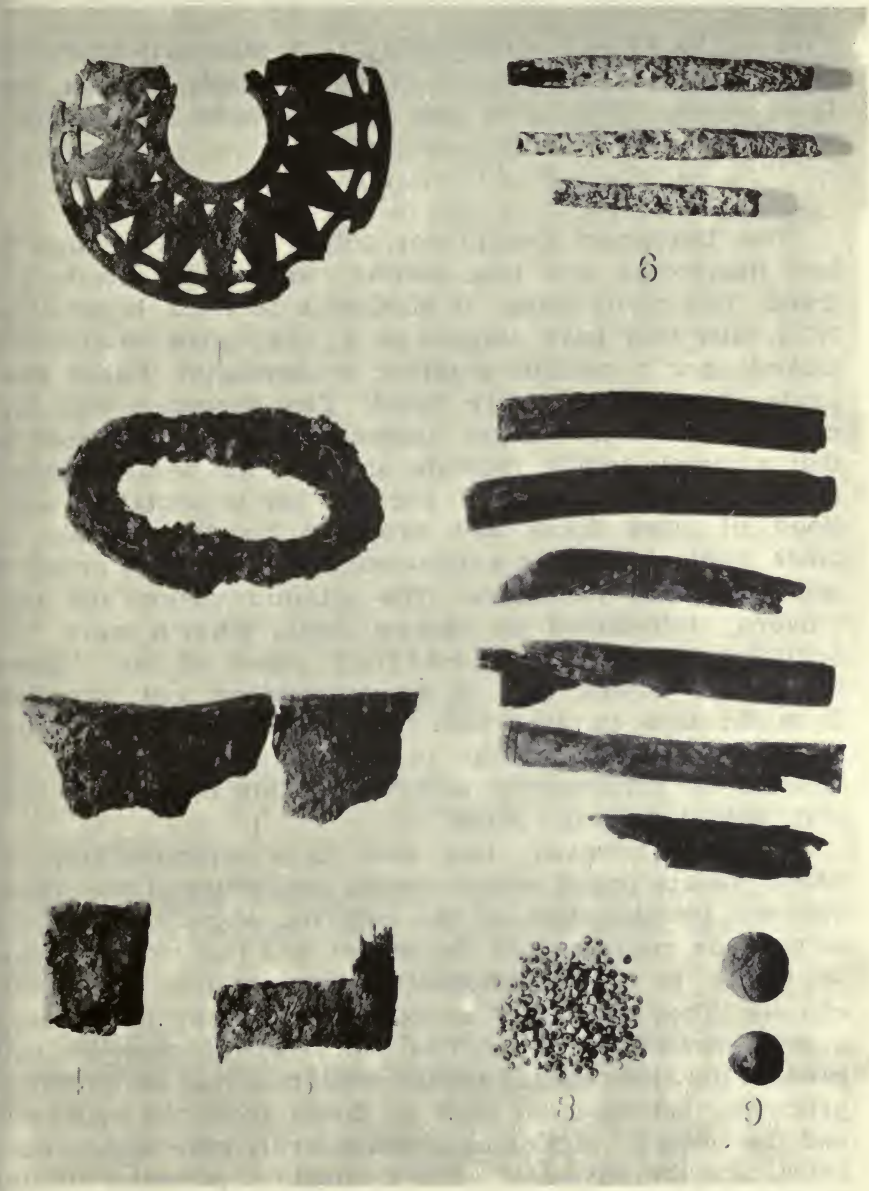

Figure 1.

THE BOOKSHELF

THE DAVENPORT CONSPIRACY by Marshall McKusick Department of Publications, The University of Iowa, Iowa City, Iowa, 1970. 142 pp., Bibliography, Illustrations $5.00 cloth, $3.00 paper.

The Davenport Conspiracy points a moral by showing how disastrous and long-lasting can be the effects of a fraud. The whole thing, if McKusick is right, began about 1876, and may have started as a joke, innocent or cruel, played upon a zealous amateur archaelogist. Fakes were made, planted, and duly found. The deception was successful with a far larger audience than was expected, so that a simple public ridicule of the victim became impossible. At the same time success led to imitation, and a flood of other fakes was provided for the gullible. All these went straight to a museum, and from there promptly into scientific literature. The misinformation and controversy introduced by these finds, which were "inscriptions" and animal-effigy pipes of the "Mound Builders," seems now to be suppressed and forgotten. It might then be that the catalogue of retribution which came upon some of the perpetrators, bystanders, and victims is justification enough for this book, especially if it could discourage fraud.

In form, however, this book is a detective story, in which we are urged to observe the unriddling of the crime, and the identification of the culprits. Many readers will already be convinced of the moral, and find more interest in trying to guess whodunit before getting to the last chapter. They will find it an excellent mystery, but not such a good detective story. The story writer must not only present the clues openly and inconspicuously as the narration proceeds, but he must have no doubt about the whole plot and the culprit. McKusick is not entirely sure that he does know, and the Appendix adds a couple of potential villains to those indicted (but not even by name) in the last chapter. It is true that, like a good detective story, this one invites a second reading to pick up the clues missed on the first. But then, like a good mystery, those clues plus only a

couple of innocuous typographical errors suggest that maybe he reader himself can clean up the loose ends the detective as left. McKusick had the advantage of manuscript records portions of which he published here), but if you have a ood library nearby, you can follow the clues and draw the onclusions for yourself. Good hunting!

Emmett L. Bennett, Jr.
University of Wisconsin, Madison

BOOKS RECEIVED

'HE FIRST AMERICAN by C.W. Ceram. Harcourt Brace ovanovich, Inc., N.Y. 1971. Price: $9.95. (North American rchaeology)

REHISTORIC AGRICULTURE Ed. by Stuart Struever. atural History Press, N.Y. 1971. Price $8.95, paperback 4.95.

'HE PREHISTORY OF CHINA by Judith M. Treistman. oubleday & Co., N.Y. 1971. Price: $5.95.

-NOTES-

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Vol. 53, No. 2
(New Series)

JUNE, 1972

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THE WISCONSIN ARCHEOLOGIST

New Series

MILWAUKEE, WISCONSIN - JUNE, 1972

Published Quarterly by The Wisconsin Archeological Society

The Sand Burr Site: A Late Archaic Lithic Assemblage From Jackson Co., Wisconsin

Peter Bleed, Department of Anthroplogy
University of Wisconsin, Madison, Wisconsin

ACKNOWLEDGEMENTS

The author would like to thank Professor James B. Stoltman and Dr. Joan Freeman for the help they have given in the preparation of this report.

The Sand Burr site (47 Ja-24) was discovered in the course of archeological survey of proposed changes in the right-of-way of Wisconsin State Highway 54. The survey was conducted in August 1968 by the author under the auspices of the State Historical Society of Wisconsin. The site is located in the S.E. 1/4 of the N.E. 1/4 and the N.E. 1/4 of the S.E. 1/4 of section 18, township 20N, range 4W in south central Jackson County. It is situated on a high sandy bluff which overlooks from the west a sharp bend in the Black River. This bluff is bounded on the north, south, and southwest by deep ravines which lead down to the river. Parts of the site may have been destroyed by construction of Old Highway 54, which ran between the area that yielded prehistoric material and the river bank, and also by construction of a town road (Old Field Road) that crossed the site to meet Highway 54.

The presence of the site was indicated by large quantities of quartzite flakes and chips scattered over the surface of large plowed fields north and south of Old Field Road. At the time of the survey, these fields were planted with corn. The site name is derived from the second most abundant crop supported by the land. A thorough examination and test excavations in adjacent undisturbed areas indicated that prehistoric material was restricted to the cultivated area. Test excavations which were made in several parts of the

field produced very little material and showed that no artifacts were contained below the plowed mantle. It was thus decided that the site did not warrant further excavation, although, a thorough surface collection was made to recover as much cultural material as possible. The sandy soil of the fields made collecting easy. In addition to the stone material, the site surface also yielded a few weathered bone fragments, two unidentifiable fragments of fresh water bivalve shells, and a few pieces of historic crockery. No prehistoric pottery was found.

This paper is intended to describe the lithic assemblage collected from the site. The fact that the collection comes only from the site surface, of course, reduces its significance, but analysis and description is warranted in spite of this fact. Since plowing had disturbed the associations and distribution of cultural material within the site, the large surface collection offers nearly as good a sample of the original site inventory as could be obtained through excavation. Furthermore, the site itself is representative of a large but poorly known class of small surface sites typical of southern Wisconsin (Joan Freeman, personal communication). As Fitting (1967) has noted, although such sites may not be impressive, an understanding of them is essential to an understanding of the prehistoric cultural systems of an area.

ARTIFACTS

With the exception of two pieces of stone which appear to have been ground, all of the artifacts recovered from the site are of chipped stone. The overwhelming majority of these were made of a rather coarse quartzite. This material appears to be Hixton silicified sandstone which Porter (1961) has reported as a resource commonly utilized by the prehistoric inhabitants of central Wisconsin. A few of the artifacts in the collection are chipped from a mottled grey chert.

Points

Durst Stemmed: The most carefully made artifact in the collection is a small expanding stemmed projectile point of white quartzite. It is 3.4 cm long with the shoulder 1.9 cm below the tip. Width at the shoulder is 1.5 cm. The stem narrows to 1 cm and expands at the base to a width of 1.2 cm.

The maximum thickness occurs near the shoulder and is .8 cm. The point is slightly asymmetrical in outline (see Fig. 1-a). In other respects it conforms closely to the Durst Stemmed type as defined by Wittry (1959) and Ritzenthaler (1968).

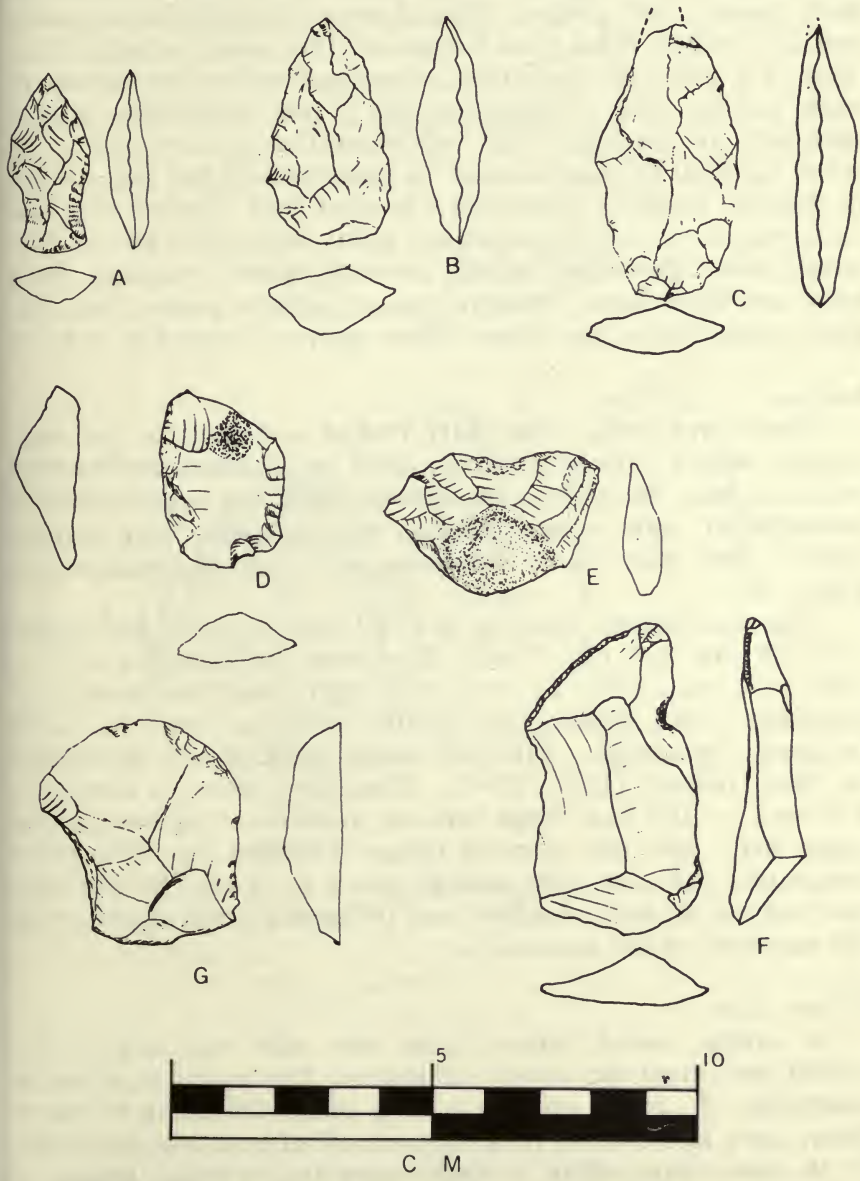

Figure 1. Stone points, knife, and scrapers from the Sand Burr site.

Unnotched Points: There are two complete and three pointed-end fragments in this category. All are made of quartzite. The whole specimens are roughly lanceolate in outline with convex bases. They range in length from 5.5 to 4.4 cm. Maximum width occurs near the midpoint on each piece and ranges from 2.8 to 2.3 cm. These points are all rather thick with maximum thickness ranging from .8 to 1.2 cm and occurring at approximately the center of each piece. The chipping on all of the specimens in this category is bifacial, but fairly coarse and irregular. In most cases it is restricted to the margins and has not served to thin the artifact. Certainly it is much less regular than the chipping seen on the stemmed point discussed above. Because these unnotched points are so thick and irregular, they may not have been suitable for projectile points and may have been made for some other purpose (see Fig. 1 b, c).

Knives

There are three bifacially flaked artifacts in the collection which were probably used as cutting implements and are thus described as knives. Two are approximately rectangular with rough bifacial flaking along both lateral edges. One may be a fragment of a longer artifact (see Fig. 1-d).

The maximum lengths are 3.1 and 2.6 cm and widths are 2.9 and 3.4 cm. Their maximum thicknesses are 1.1 and 1.0 cm. One is of gray chert and the other is of quartzite. The pieces are quite irregular and in some respects resemble PIECES ESQUILLÉES as discussed by Mac Donald (1968: 85-7). The third knife is longer -- 5.0 cm. -- and has rough bifacial retouch along one lateral edge with one end worked into a rounded tip. This piece measures 3.8 cm wide and as thick as .7 cm. In all cases the flaking is very coarse and irregular and restricted to the margins of the knives.

Biface Axe

A single ovoid biface from the site was apparently hafted and used for heavy chopping. The piece is of white quartzite. It is in outline a long oval. Chopping or other heavy use has broken large pieces off of both narrow ends. It is thus impossible to determine the original length of the artifact. There is a large round notch on one of the

lateral edges at what would be approximately the midpoint. This was apparently made to facilitate hafting. The edge opposite the notch has been dulled by grinding or fine

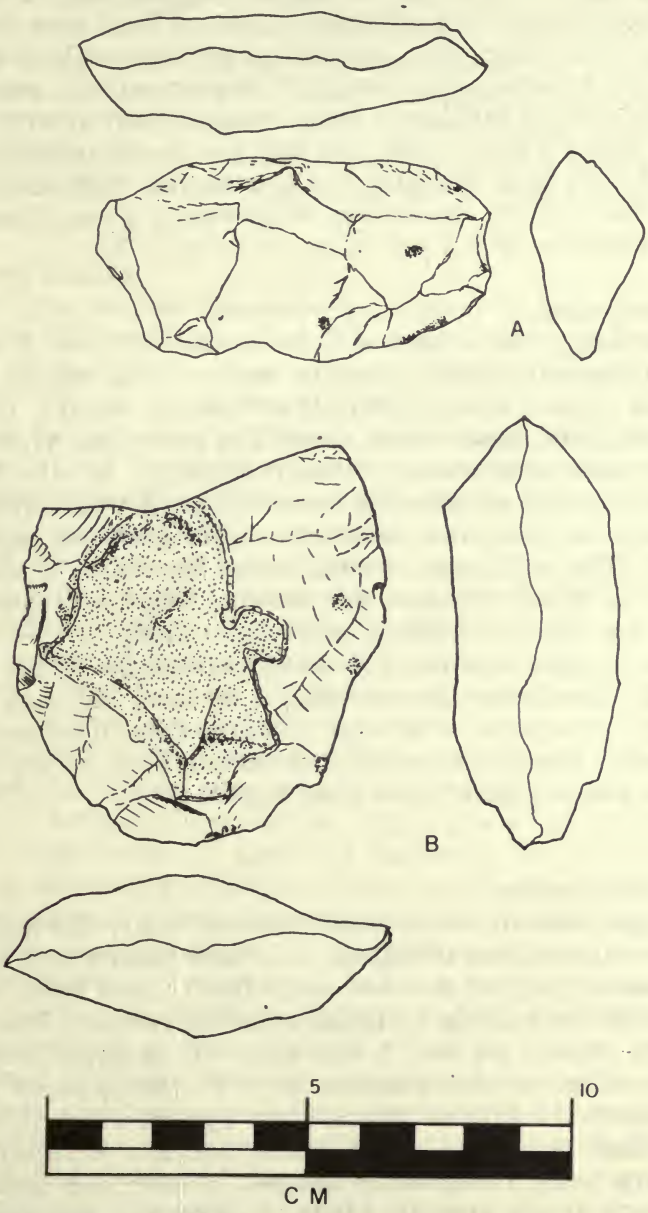

Figure 2. Biface axe and preformed blank from the Sand Burr site.

battering. This would appear to be either the product of hafting or a step intentionally taken to ease hafting. Examination under a microscope does not show any polish or other evidence of wear which typically results from hafting (Semenov, 1964: 122) although it is possible, even probable, that an axe like this one of quartzite would not remain sharp or useable long enough to acquire such a polish. The axe was shaped with heavy blows which removed large flakes. Their scars reach from the margin to the median. Finer retouch was used to finish the edges. The width at the notch is 3.4 cm and the maximum thickness is 2 cm. The portion which remains is 7.2 cm in length (Fig. 2-a).

End Scrapers

The four end scrapers in the collection are all made on large quartzite flakes. One is made on the distal end of a parallel flake (White, 1963: 8) but for the others, irregular or incomplete flakes were used. The functional area on each was formed with steep unifacial retouch. In all cases this edge is slightly convex and is set obliquely transverse to the long axis of the flake on which the scraper was made (Fig. 1-f, g). The maximum widths of the functional areas range from 2.1 to 3.2 cm and the working lengths range from .3 to 1.0 cm (White, 1963: 41). Retouch chipping is restricted to these areas and in no case was the shape of the original flake significantly altered. One specimen has had a small notch chipped into a lateral edge near the functional area. This notch appears to be similar to those seen on the concave scrapers described below (see Fig. 1-f).

Concave Scrapers

In addition to the notched end scraper, the collection also contains seven irregular quartzite flakes which have a small notch chipped into one edge. In all cases these notches were made with steep unifacial crushing retouch. They range in width from 1.1 to .6 cm and vary in depth from .5 to .2 cm. One of the notches is "V" shaped and slightly asymmetrical. All the others show symmetrical round outlines. The flakes on which these concave scrapers were made are very irregularly shaped. There was apparently no attempt to use specific kinds of flakes nor was there any attempt to shape the flakes which were chosen. Except for

the notch there is no retouch present on any of the pieces in this category. Two of the pieces were made on very small flakes with maximum widths (as measured at right angles to the axis of the functional edge) of less than 1.7 cm. Two of the flakes still have portions of the rock cortex adhering. On the three flakes which retain striking platforms, positioning of the notch appears to have been completely independent of this or other landmarks that archeologists commonly identify. In four cases the notch was placed on a lateral edge of the flake and in the remaining three it is located on a transverse margin (see Fig. 1-e).

Preformed Blanks

There are seven incomplete roughly made quartzite artifacts in this category. Two have ovoid outlines with large portions of one end broken away. Three are small pieces apparently broken from the ends of similar ovoids and the remaining two are central pieces which have had both ends broken away. All have large portions of cortex remaining on one or both faces. The flaking seen on these bifaces is very rough and irregular and no attempt has been made to straighten the edges with finer retouching. Of course, it has been impossible to determine the original length of any of these artifacts. The measurable specimens vary in width from 8.3 to 5.8 cm and maximum thicknesses range from 2.5 to 3.0 cm. The function of these artifacts is not clearly apparent. They do not appear to have been cores made for the production of flakes since they retain large areas of cortex and the flakes which have been detached were very irregular in both size and shape. There are a few small and irregular removals or signs of battering on the narrow margins of three of the bifaces. These may indicate that they were used as heavy chopping tools. Because battering is so sparse, this interpretation is unsatisfactory and it seems more acceptable to compare it to the battering present on the outer edge of the striking platforms of most of the flakes of bifacial retouch in the collection. Thus the bifaces appear to be unused preformed blanks which were not finished into tools. These specimens may have survived in an unfinished form because they were unintentionally broken in the course of flaking and thus had to be abandoned (see Fig. 2-b).

Retouched Flakes

There are in the collection seven fragments which show

definite retouch chipping along some margin. Two of these are large fragments of quartzite which have portions of cortex adhering. Both had one long straight margin unifacially retouched. Three smaller quartzite flakes also show marginal retouch: two unifacial and the third bifacial. The remaining two pieces in this group are flakes of mottled gray chert. One has a single margin finished with very fine regular unifacial retouch and the other has the same fine retouch bifacially applied to both lateral margins. Besides these obviously worked pieces virtually every quartzite flake in the collection shows small removals from one or more margins. Almost certainly most of these represent natural breakage since the stone is very brittle and the thin flake edges break easily. This fact is witnessed by the small pile of sand grains left on the sorting table every time the collection is moved or sorted. Moreover, the coarse texture of the quartzite makes it very difficult to recognize fine retouch flaking. Thus the worked pieces described above may not be the only utilized flakes in the collection, but the vast majority of flakes give no positive sign of utilization and there are definitely no readily apparent patterns of flake utilization seen in the assemblage.

Ground Stone Artifacts

There are two fragmented ground stone tools in the collection. Both are made of fine grain sandstone and may have been shaped or broken from a single original nucleus. Both are flat and circular pieces which have had a shallow depression worn in one face. The opposite face on both pieces is a flat broken surface. On one piece this face is smoothed as if it had been rubbed on a flat surface. The other piece shows very little evidence of wear on this face. The larger piece is 5.4 cm in diameter and has a maximum thickness of 1.4 cm. The diameter of the smaller fragment cannot be measured. It is 1.0 cm thick.

DEBITAGE

The bulk of the collection consists of 1008 pieces of stone waste. This material appears to be a by-product of stone tool production. Sorting the flakes into color categories or groups which could have been struck from the same blank showed that there were several groups of flakes in the collection which had been struck from a common nucleus. In

no case, however, were two flakes successfully fitted together. Thus, striking sequence, progression and other specifics of the stone-working technique cannot be reconstructed. It seems safe to assume, however, that the patterns of stone tool production conducted at the site will be reflected in patterns within the debitage collection. Debitage patterns can thus be used to characterize stone tool production patterns and as a means of comparing this collection to assemblages from other sites. Three categories have been used to describe the composition of the Sand Burr collection. These are: 1) non-flake fragments, 2) flakes of bifacial retouch, and 3) decortication flakes. The last two are in turn subdivided. These categories draw heavily on typologies devised by White (1963), Fitting (1966; 1968), Binford and Quimby (1963), Mac Donald (1968), Frison (1968), Mewhinney (1964), and Witthoft (1952).

Non-flake Fragments

There are twelve irregularly shaped fragments of quartzite (6) and chert (6) in this category. Some pieces are fairly massive and they are all blocky fragments, as Witthoft (1952: 474) notes, either triangular or rectangular in cross section so that the cleavage planes are separated by right or acute angles. None of the non-flake fragments show a striking platform or bulb of percussion and most have cortex adhering to a portion of their surface. The fragments would appear to be a residue of very rough stone working and the small size of the category would indicate that such rough work was not an important aspect of the stone-working technology carried on at the site. Statistical information on the category is shown in Table 1.

	Number	% of Total	Weight	% of Total	Weight Range	Chert	Quartzite
Nonflakes	12	1.19	401.9	15.93	157.3-1.1	6	6
Decortication Flakes							
Incomplete	85	8.43	195.2	7.74	19.8-0.3	2	83
Primary A	3	.30	32.5	1.29	18.4-4.0	0	3
B	7	.69	81.4	3.23	24.2-1.1	0	7
Secondary A	10	.99	33.9	1.34	8.9-1.1	0	10
B	11	1.09	97.9	3.88	18.6-2.6	0	11
C	24	2.38	99.5	3.94	9.1-0.9	0	24
D	61	6.05	270.8	10.74	15.6-0.8	1	60
Flakes of Bifacial Retouch							
Incomplete	460	45.63	579.9	22.99	15.9-0.2	21	439
Platform	302	29.96	721.1	28.59	38.9-0.3	2	300
Retouch	33	3.27	8.1	.32	0.5-0.2	1	32
TOTAL	1008	99.98	2521.2	99.99		33(3.3%)	975(96.7%)

Table I Debitage categories

Flakes of Bifacial Retouch

A flake of bifacial retouch is one struck from a tool or blank which had been bifacially flaked before the flake itself was detached. These flakes therefore never have cortex adhering to them. The striking platform is either a single plane or has two or more facets and the dorsal face shows several facets left by previous removals. Nearly always these flakes have an acute striking angle. In the Sand Burr collection there are 795 flakes of bifacial retouch. These can be divided into two gross categories. Three hundred and thirty-five of the flakes are complete in that they retain a bulb of percussion and striking platform. These flakes can be further described and related to specific technological processes. The remaining 460 flakes of bifacial retouch are incomplete, lacking striking platforms.

To describe the complete flakes of bifacial retouch they were first weighed and placed in arbitrary weight categories. The smallest category was composed of flakes of less than one gram. The categories increased in one gram increments up to flakes of more than 10 grams. The relative size of these categories in terms of both number of flakes and weight, is shown in Table 2. This table shows that nearly half of the flakes of bifacial retouch weigh less than one gram. It further shows that the number of flakes in each category is reduced by about one half with each progressively heavier category. In terms of total weight, however the units are more equal. Table 2 also shows that there are attribute differences between the flakes of different weight categories. These differences can be summarized by defining two sub-types of flakes of bifacial retouch. For want of better terms, these may be called platform flakes and retouch flakes.

There are 302 complete PLATFORM FLAKES in the Sand Burr collection. All have a relatively large striking platform with an acute angle between it and the dorsal face although in some cases this angle approaches 90°. This indicates bifacial flaking was carried out on blanks of lenticular cross section although some of these appear to have been fairly thick and massive. On more than 90% of the flakes the outer edge of the striking platform shows either signs of irregular battering or has had small flakes removed from it. Although these could conceivably be signs of wear or use or may have resulted from blows which did

Weight Category	Number	% of Total	Weight	% of Total	Acute Angle	Scar	Parallel	Expanding	Lip	Edge Battering
10+gm	7	2.09	137.2	18.82	7	5	3	4	0	6
9-10	4	1.19	39.9	5.47	4	2	1	3	0	3
8-9	2	.60	16.7	2.29	2	1	0	2	0	2
7-8	6	1.79	45.7	6.27	6	4	2	4	0	5
6-7	4	1.19	26.9	3.69	4	4	2	2	0	4
5-6	7	2.09	37.6	5.16	4	7	0	7	2	7
4-5	13	3.88	59.1	8.10	13	7	2	11	7	10
3-4	24	7.16	83.3	11.42	24	16	3	21	4	20
2-3	36	10.74	90.1	12.36	36	20	8	24	12	33
1-2	76	22.69	108.1	14.82	76	13	8	68	36	71
<1	156	46.57	84.6	11.60	156	32	37	86	48	58
TOTAL	335	99.99	729.2	100.00						

Table II Bifacial retouch flake weight categories

not succeed in detaching a flake, it is more likely that the platform battering was intentionally added to facilitate removal of the flake. As mentioned earlier, the rough bifaces in the collection show this same type of battering and it appears that large flakes detached from any of them would be assigned to this category. Table 2 shows that bulbar scars are commonly present on platform flakes of all sizes. Approximately 20% (61) of the category are parallel flakes (White 1963:9) while the remaining pieces (241) are expanding flakes in White's (1963:32) definition. If the distinction made by Fitting (1968:32) and others between flakes detached with hard and soft hammers is valid, both techniques appear to be represented in the collection. As shown in Table 2, none of the large (heavier) flakes have "lips" or small overhangs between the striking platforms and the ventral face. These heavy flakes have large though still acute striking angles and several have large scars at the point of impact. Platform lips are found only on the smaller platform flakes (less-than-one-gram to six grams) and flakes with such lips form a distinct minority in any case. The striking angles on the lighter flakes vary in size and several flakes have large bulbar scars. There is thus no single attribute which distinguishes the larger ("hard hammer") from the smaller ("soft hammer") flakes. I am also unable to objectively identify different types on the basis of large versus small bulbs of percussion as Fitting (1968:33) and others have suggested might be possible. Edge battering occurs on flakes of all sizes. It therefore appears that different techniques may have been employed to detach larger and smaller platform flakes of bifacial retouch at the Sand Burr site. The process was similar in any case and there is no positive means of isolating

categories of flakes produced by the different techniques.

RETOUCH FLAKES form a more distinct and easily defined category which appears to have been produced by pressure flaking. These are all small -- less than one gram -- flakes which have very small striking platforms. Insofar as they can be accurately measured, their striking angles are acute. They show no battering on the platform edge and most (85% or 28) are expanding flakes: the remaining specimens in this category have parallel lateral margins. In all there are only 33 retouch flakes in the collection. This category is, therefore, very small; comprising less than 4% of the flakes from the site and less than 1% of the debitage in terms of weight. This may reflect a sampling error caused by the fact that our survey missed the very small retouch flakes. It should, however, be noted in this regard that the platform flakes in the less-than-one-gram category are only slightly larger in size than the retouch flakes. Thus the small size of the retouch flakes category indicates that fine, pressure retouch was not of major importance in the Sand Burr stone technology. This is, of course, the conclusion to be derived from examination of the finished artifacts in the collection which show only very little fine retouch. This preference may have been a result of the stone material used at the site. Experiments with both antler and copper tools showed that pressure to the edge of a quartzite flake could remove "retouch flakes," but more commonly fragmented flakes or only sand grains were removed by this technique. The steep crushing retouch used to shape the concave scrapers and other artifacts seems to have been a replacement for pressure retouch flaking which was not adapted to the quartzite worked with at the site.

The incomplete flakes of bifacial retouch admittedly form a residual category (as noted by Fitting, 1968:33). These are definitely flakes of bifacial retouch although they are so fragmented that their original shape, striking angle, axis of percussion, and weight cannot be determined. In many cases it appears the incomplete flakes were broken near the platform along large "bulbar scars." It also seems likely that the missing portions may have shattered away when the flakes were detached. Most of the incomplete flakes appear similar to platform flakes. Fitting (1968:33) suggests that such incomplete flakes could be further sub-

divided into meaningful categories. I am frankly skeptical on this point. Perhaps the most important aspect of the category is its importance in the whole collection. Table 1 shows that incomplete flakes of bifacial retouch account for 40% of the total pieces of debitage from the site (23% of the weight). Since the flakes in this category seem basically similar to complete flakes of bifacial retouch, the large size of the category probably does not signal a cultural pattern. Instead it more likely indicates that the quartzite used at the site fragmented easily.

Decortication Flakes

Decortication flakes are defined by White (1963:5) as flakes removed from the exterior surface of a nodule. Flakes which have cortex or a weathered surface adhering to them are included in this category. There are 201 such flakes from the Sand Burr site. Eighty-five of these are fragmented and incomplete so that they do not include a striking platform or bulb of percussion. They cannot be further classified on the basis of the techniques involved in their production. Their total weight is 195.2 gm and the fragments range in weight from 19.8 to .3 gm (see Table 1).

The WHOLE DECORTICATION FLAKES in the collection have been classified into six categories on the basis of the location of the cortex covered portion relative to the striking platform. Most of the decortication flakes in the collection appear to have been detached in order to remove cortex and present a fresh surface for further work.

PRIMARY DECORTICATION FLAKES are defined by White (1963:5) as the first flakes struck from a nodule. The entire dorsal face of such flakes is thus covered with cortex. There are (a) three true primary decortication flakes in the Sand Burr collection. Cortex covers the striking platforms and the entire dorsal face of these flakes. The three weigh 32.5 gm and range from 18.4 to 4.0 gm (Table 1). A second category of primary decortication flakes (b) consists of seven flakes which have their entire dorsal face covered with cortex although their striking platforms are located on unweathered surfaces. One of these is quite small, weighing only 1.0 gm. The remaining six are larger, ranging in weight from 4.0 to 24.2 gms. The category weighs 81.4 gm.

Most of the decortication flakes in the collection would

be termed SECONDARY DECORTICATION FLAKES by White (1963:5). These are flakes which have only a portion of the dorsal face covered with cortex. There are four categories of secondary decortication flakes in the Sand Burr collection:

a) Ten small flakes have cortex only on their striking platforms (see Table 1).

b) On eleven of the quartzite flakes most of the dorsal face is covered with cortex although the striking platforms and most of the margins show fresh surfaces (Table 1).

c) This category consists of 24 flakes; all of quartzite. They all have cortex along most or all of one lateral margin. In most cases they are triangular in cross section with one of the dorsal facets covered with cortex. All have acute striking angles and two have platform lips. Eight show battering on the outer edge of the platform. They are thus very similar to other flakes in the assemblage. None of these flakes show unusual signs of use or retouch along the margin opposite the cortex (see Table 1).

d) The 61 flakes in this category have their striking platform and most of the lateral margins and dorsal face free from cortex. Cortex does, however, adhere to the distal margin. Formally these flakes are much like flakes of bifacial retouch. All have acute striking angles; 46 have platform edge battering and platform lips are present on 12 of the sample. Twenty are parallel flakes. These flakes are generally less regular than flakes of bifacial retouch, but, except for this, they seem basically similar to them and were probably produced in a similar way. They appear to be flakes of bifacial retouch which were detached from a preform which had not been completely decorticated.

In total, decortication flakes account for only about 30% of the debitage. The small number of primary decortication flakes indicates that initial decortication was done away from the site. Most of the cortex removal which was carried out was done in exactly the same manner as subsequent bifacial flaking. It was apparently not a separate technological process.

Fire Cracked Rock

In addition to the debitage resulting from stone tool production, the Sand Burr site also yielded 60 irregular stone fragments. These are all very irregular; they show no

striking platforms or bulbs of percussion and all are darkened and heavily weathered indicating that they have been exposed to fire. Most of the fragments include some of the original surface and they appear to have been fist-sized cobbles before they were broken. Quartz fragments account for six of the fragments, quartzite for 23 and the remaining 31 fragments are of basaltic rocks.

SUMMARY AND CONCLUSIONS

The Sand Burr site can be linked to the Late Archaic period on the basis of the Durst Stemmed point in the collection and because no aboriginal pottery was found at the site. Resting as it does largely on negative evidence, however, this linkage must remain tentative. The artifact assemblage suggests that such domestic occupations as stone boiling, wood and leather working were carried on at the site. The diversity of the assemblage makes it certain that the site was more than a "chipping station," although certainly the most well-witnessed activity is the production of stone tools. If we make what appears to be the safe assumption that the collected sample is generally reflective of the original site inventory, it is possible to make some observations about the lithic technology employed at the site.

Larger tools, such as the biface axe, were made with fairly coarse bifacial chipping. They were worked down from larger preformed blanks which had been initially decorticated and shaped before being brought to the site. Parts of seven such blanks survived and are included in the collection. Further decorticating and subsequent bifacial thinning done at the site employed the same basic technique although flakes which have been associated with both "soft" and "hard" hammers are included in the assemblage. A few flakes produced as a by-product of this bifacial working were further worked into tools. Such tools were made on various types of flakes and the location of the functional area on the flake was variable. Fine pressure retouch appears to have formed a minor part of the lithic technology; a preference perhaps determined largely by the raw material used at the site. The high number of incomplete flakes, likewise, appears to reflect on the raw material rather than on a pattern of the lithic technology of the prehistoric occupants of the Sand Burr site.

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ARCHAEOLOGICAL SURVEY OF THE COLUMBIA COUNTY POWER PLANT

Gordon R. Peters and David F. Overstreet
University of Wisconsin - Milwaukee

The area in which the survey was conducted is about five miles south of Portage, Wisconsin, in Columbia County. The tract of land is bordered on the south by county trunk road "J," on the east by the C.M. St. Paul and Pacific Railroad right of way, on the north by State Highways 51/16, and on the west by the Wisconsin River. It is located in T12N, R9E, sections 15, 16, 21, 22, 27, 28, 33, and 34 of Pacific township, and in T11N, R9E, sections 3, 4, and 5 of Dekorra township. The total area encompasses approximately 4.5 miles (see plate 1).

The purpose of the survey was the location and testing of both known and unknown historic and prehistoric archaeological sites in order to ascertain their importance for future excavation and preservation. The survey was conducted during late June and early July, 1970, on land purchased by the Wisconsin Power and Light Company. Their intent was the construction of a power station which included a 1,000 acre cooling lake. This proposed construction would result either in the inundation of sites within the lake bed, or the destruction of sites by disturbance through the removal of earth to construct dikes.

Some 80% of the area surveyed is wet-grassy marshland below the 800 foot elevation level, and joins the east bank of the Wisconsin River at an elevation of 780 feet. The marsh contains several pot holes in which standing water is present throughout the year. Duck Creek, appropriately named as it is a nesting area for a variety of waterfowl, runs through the center of the marsh from northeast to southwest, and joins the Wisconsin River on the west end of the power station tract.

Marsh flora consists of a variety of wetland grasses with a few clumps of willows around pot holes and creek beds. At this point in time it is considered unsuitable for permanent human habitation. It is also assumed to be uninhabited during prehistoric times, since no sites were found on the floor of the marsh. Further, during past times the marsh may have been part of the Wisconsin River, and perhaps an ox-bow lake.

Fauna observed during the summer in the marsh area consisted of both blue and green heron, several species of ducks, and at least one family of sandhill crane with young. The marsh, located within the Mississippi Flyway, has large populations of migrating waterfowl seasonally. It is assumed that migration patterns of these waterfowl have not changed radically since prehistoric times.

The remaining 20% of the area consists of a series of sandy ridges, deflated or wind eroded in several areas. The elevation of these ridges ranges from 800 to 860 feet above sea level. Flora in this area consists of prairie grasses, assorted prairie flowers, various bushes and shrubs, and mixed stands of hardwoods with intrusions of pine. Fauna observed in these ridge areas include deer, rabbit, and red fox.

The sites were located at the 800 foot level near the edge of, and on top of, the aforementioned ridges in the marsh. Through intensive surface collection and testing of the area, no unrecorded sites were found; however, all recorded sites were located.

Interpretation of these sites was of major concern, and, unfortunately, two major problems arose in such interpretation. First, wind erosion, or deflation resulted in the destruction of any stratigraphic context and therefore true associations of recovered artifacts were impossible to interpret. Further, testing in areas which, on the surface, appeared erosion free were covered by varying depths of overburden, often with buried humus lines. This phenomenon made stratigraphic relationships extremely difficult to interpret. The area, as a whole, can be considered as a disturbed habitat and as such prohibits meaningful stratigraphic interpretation of both cultural and natural horizons.

A second major problem was the activity of local collectors. After arriving at the site following an early morning rain, no less than five sets of footprints traversed many of the exposed archaeological sites. It is our assumption that this area has been intensively collected over a sustained period of time. In our opinion, this activity reduced the percentage of diagnostic artifact recovery to a minimum.

From about 80 pounds of lithic debris collected from the sites for future analysis, the diagnostic artifacts appear to be far below the expected quantity. Detritus includes

Baraboo quartzite, Hixton silicified sandstone, white, brown, gray, yellow, red, and assorted banded cherts. Because of the lack of site delineation and the loss of stratigraphic context, the artifacts will be discussed in typological categories rather than in situ contexts. These types were founded on the formal morphology of the artifacts and not through diagnostic wear patterns.

Three entire projectile points and fifteen fragments were collected from the power plant tract. Two of the projectile points, a large side notched and a Durst Stemmed point have been assigned to the Archaic tradition. The third point, a small side notched flake point is of probable Late Woodland origin. The base of a lanceolate point, manufactured from a banded chert, was also recovered; however, its origin is undetermined, as are the other point fragments.

Scrapers have been classified into three types. The first category, thumb scrapers, totaled fifteen. The second undefined category consists of three large fragments of worked chert. Steep marginal retouching on the working edge of the fragments indicates their probable use as scrapers. The third type of scraper is a hafted crescent shaped form of probable Archaic tradition origin. This proposed origin is based upon evidence of grinding on the haft element or base of the artifact, though the base is not complete.

Two broken drill tips of undetermined origin were recovered from the area. There is little one can state about these artifacts when found out of association.

Knives have been classified into two possible categories, of which one category is subject to close scrutiny. That is, the three fragmentary small pointed knives, which comprise this category, may not, in fact, be knives. Microscopic analysis of wear patterns could yield further insights into this problem. The other category is comprised of four fragments of large, crudely retouched knives. Origins of all items of this class (knives) are undetermined.

One fragment of a ground stone implement, which appears to be a quarter section of a celt, was recovered. This fragment could be associated with any prehistoric group which occupied the area.

The ceramic inventory is even less impressive. This consists of twenty-one grit tempered sherds, some exhibiting

cord wrapping, which occurred in a small surface concentration. Testing in the area produced no other cultural debris.

Three mounds were also located on the power plant tract including one small conical mound, a small linear mound, and an effigy mound, possibly a panther. Due to a lack of time, resources and a problem orientation or research design, no testing or excavations of the mounds were conducted. However, their existence was brought to the attention of the Wisconsin Power and Light Company and assurances of their preservation was secured.

It is our contention that the sites mentioned were seasonal campsites utilized from Archaic through Late Woodland tradition times, perhaps for the exploitation of migratory waterfowl or spawning fish. On the basis of our collected data, our speculation derives from the lack of evidence to support other conclusions, rather than strong evidence to support our own. The following negative evidence has been considered in reaching the previously stated conclusions. First, the complete absence of mammal bone or other refuse, although this may be a result of exposure of the sites through deflation, supports our contentions. Secondly, there is an abundance of fire-cracked rock, lithic debris, and nonassociable artifacts found together, indicating, perhaps, the continuance of small campsites over a prolonged period of time. Third, testing revealed no indication of any house or other structures, refuse pits, midden deposits, or any other subsurface disturbances other than small fire pits: another possible indication of seasonal or temporary habitation of the area. Finally, as stated earlier, the sites all occur near the edge of higher ground or atop ridges. This pattern suggests an optimal location for the exploitation of waterfowl or fish consistent with hunting and gathering subsistence patterns.

In conclusion, we would like to acknowledge the assistance and cooperation of several institutions. This project was financed by the Wisconsin Power and Light Company, directed through the Wisconsin Archaeological Survey, and administered by the State Historical Society of Wisconsin. Special appreciation is directed to the Wisconsin Power and Light Company for their financial support and material assistance, and, further, for their interest in the preservation of Wisconsin antiquities.

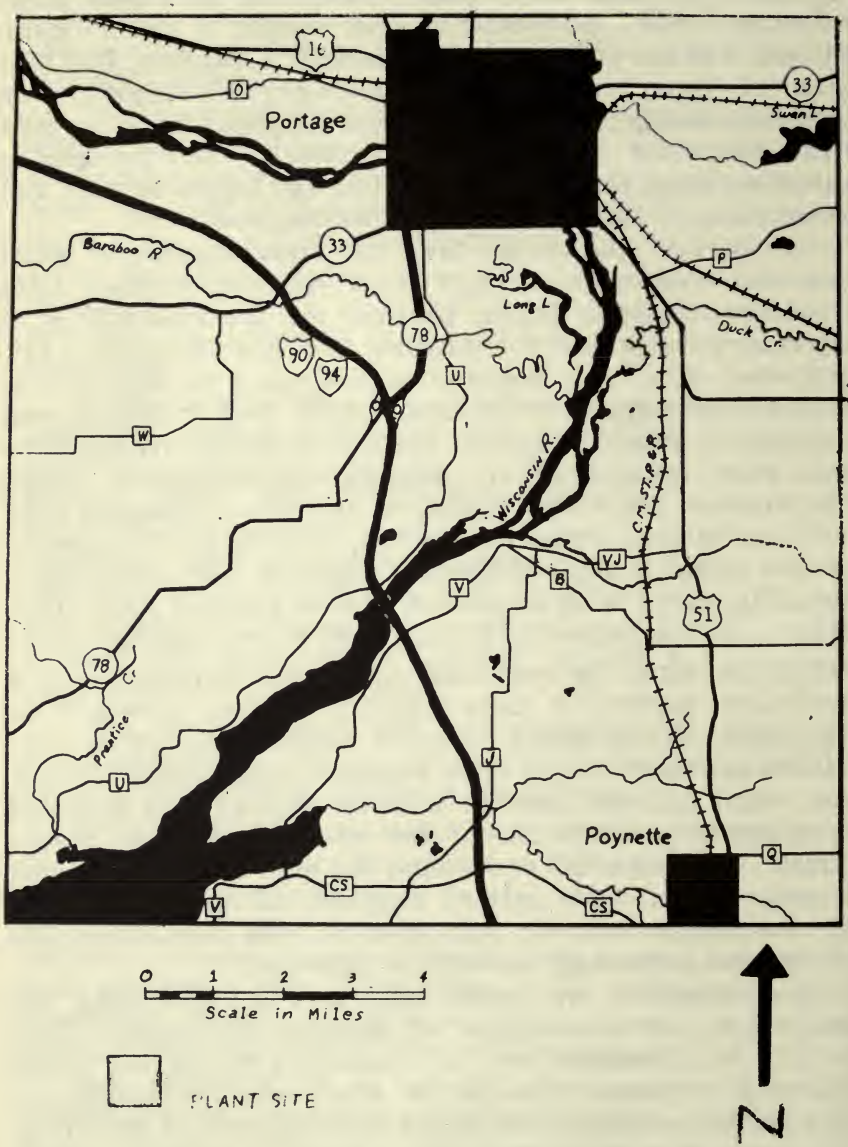

Plate 1. Site of the Columbia Power Station in Columbia County, Wisconsin.

Plate 2. Projectile points collected during the survey.

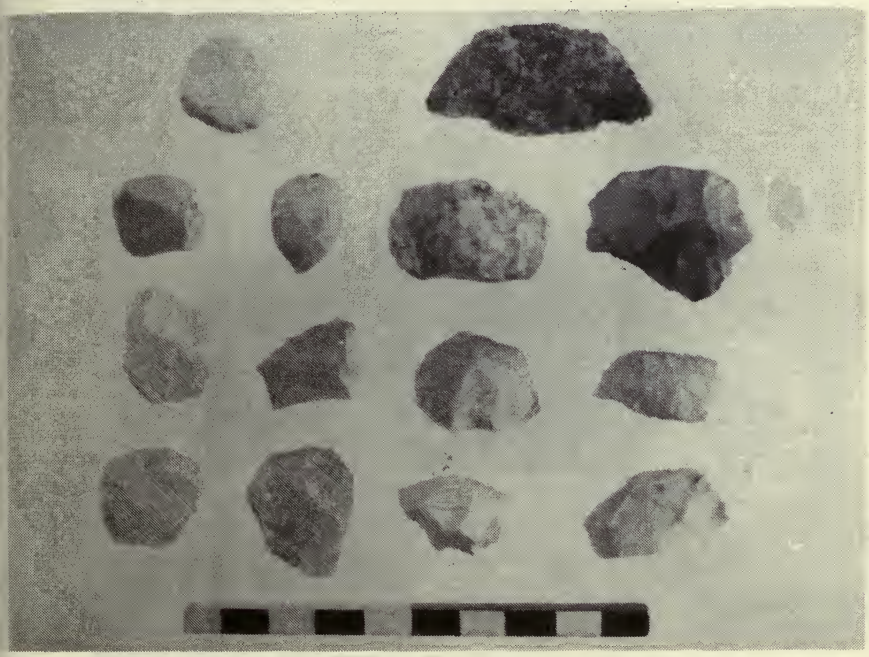

Plate 3. Scrapers collected during the survey (hafted scraper: upper-right).

Plate 4. Ground stone fragment (celt?) (left), and drill fragments (right).

Plate 5. Knife fragments collected during the survey.

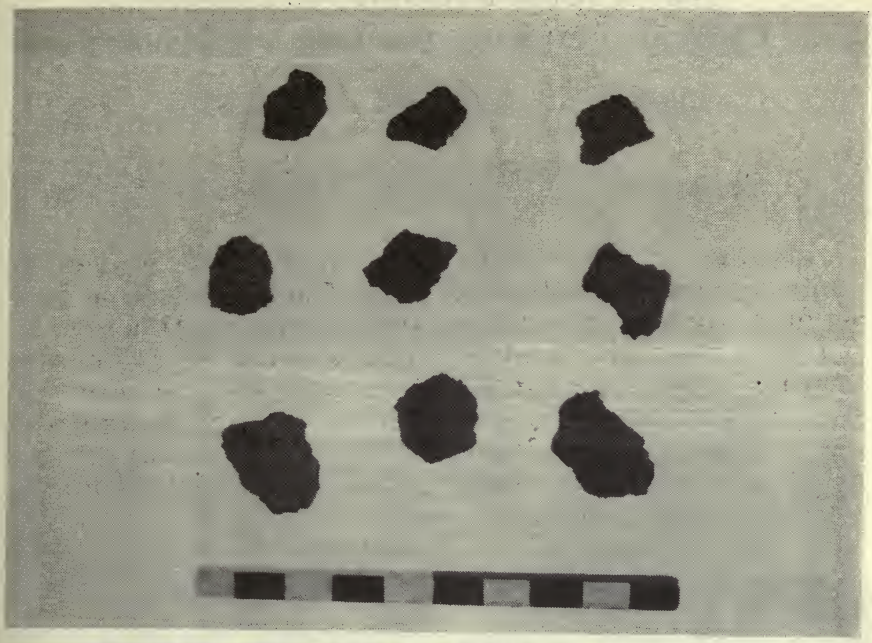

Plate 6. Ceramics, grit tempered, collected during the survey.

Plate 7. Total lithic assemblage collected during the survey.

THE CLARENCE CURRIE COLLECTION FROM ST. CROIX STATE PARK, MINNESOTA*

Christy A.H. Caine and T. Allen Caine
St. Francis Xavier University
Antigonish, Nova Scotia

Because of the paucity of excavations along the St. Croix watershed in Minnesota, the Currie collection may be of particular interest to archaeologists. Although the Currie collection contains artifacts from areas outside Minnesota, all the artifacts discussed here are from the St. Croix State Park area. All but one of the artifacts came from the Currie farm in St. Croix State Park (T.40, R. 18, Sec. 8), and were uncovered as the result of plowing and other farm activities.

Of particular interest are two catlinite pipes and a copper

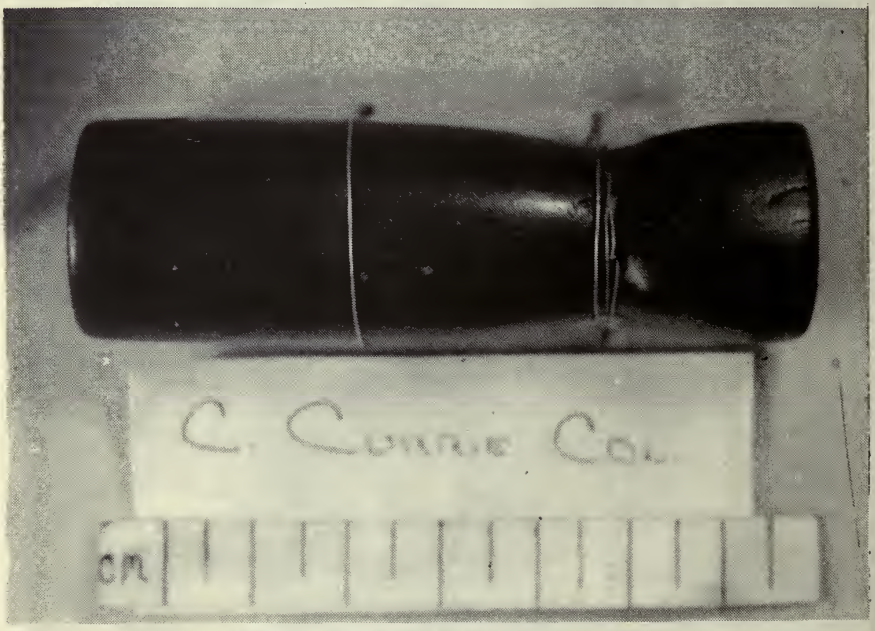

Plate 1. Cylindrical catlinite pipe.

*The authors wisn to express their appreciation to the Clarence Currie family for permission to examine this collection.

celt. The cylindrical pipe (Plate 1) is of a deep red catlinite, carefully smoothed and very symmetrical. It is 8 cm long and a little over 2 cm in diameter.

Plate 2. Tiered-block catlinite pipe. Bowl is at left.

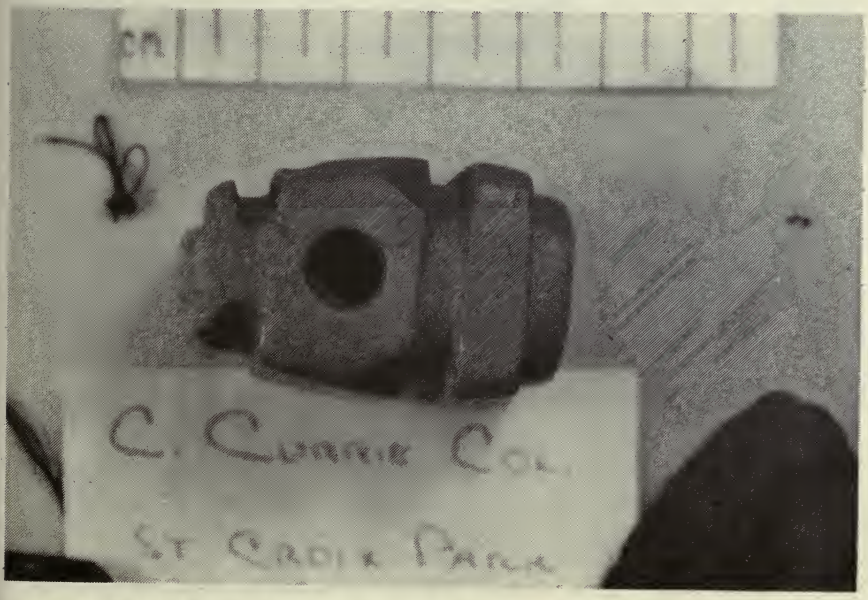

Plate 3. Tiered-block catlinite pipe showing stem opening. Bowl is at right.

A second pipe, collected from the area near Sand Creek, site of a former Indian village, is of a lighter colored pinkish-red catlinite. The design is basically a tiered block with an incised pendant-triangle design along the upper border (Plates 2, 3).

The copper celt, collected from the Currie farm, has a beveled bit and is rectangular in cross section (Plate 4). Length is 18 cm and width is 4 cm. The celt is similar to Wittry's Group VI-B, but is not triangular in outline. Its general outline is similar to his Group VI-J, but the Currie specimen is biconvex in vertical outline, rather than curved (see Wittry, 1957:12). The Currie artifact is similar in general configuration to numerous copper celts found in both Minnesota and Wisconsin, but is very carefully made and well preserved. The Neville Public Museum collection, for example, contains celts of this type, some of which are probably post-Archaic (Mason and Mason, 1967:120-123).

Chipped stone artifacts comprise the remainder of the

Plate 4. Left: copper celt; center: two catlinite pipes; right; second from bottom: quartzite drill; remaining artifacts: scrapersand bifaces.

collection and include nineteen projectile points, ten scrapers, four blades and two drills.

The seven triangular points in the collection (Plate 5, lower left) are typical of the Late Woodland in this area as

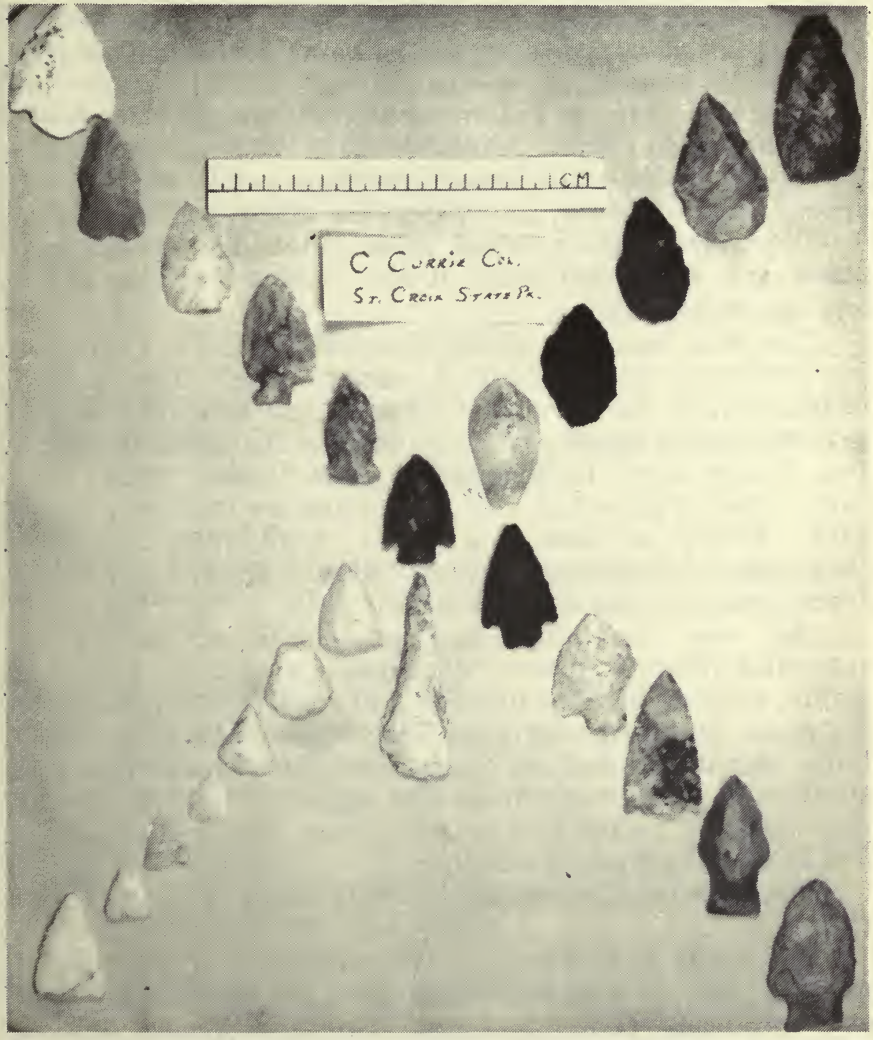

Plate 5. Upper left: corner-notched point; reworked triangular point; broken point; side-notched point; cride side-notched point. Center: stemmed point similar to Fox River type; Lower right: stemmed point similar to Fox River type; reworked point; corner-notched point, base broken; stemmed point, similar to Durst; stemmed point, similar to Durst. Upper right: ovoid point; three ovoid scrapers; ovoid blade. Lower center: drill with unfinished expanding base. Lower left: triangular points.

well as throughout most of the Eastern Woodlands. MacNeish refers to points of this type as Eastern Triangular and dates them from about A.D. 1000 to 1750 in eastern Manitoba (MacNeish, 1958:103). Points of this type are common in the more recent components of Minnesota sites.

Two points are corner-notched (Plate 5). One (incomplete) white chert specimen is Snyders-like in outline, but the face is crudely worked. A second corner-notched point (incomplete) is of finely retouched mottled tan chert. Corner-notched points have generally been considered Middle Woodland in time. However, the two points here do not appear to fall into any presently defined point types.

The single side-notched point (Plate 5) has an ovoid blade and a straight base. It also does not appear to fall into any defined type.

The four stemmed points, however, seem to represent two different types (Plate 5, lower right). Two points, characterized by abrupt shoulders and unworked bases, are similar to points which have been recovered from the Fox Valley area in Wisconsin (Ritzenthaler, 1968). The same type of point has also been noted for the lower Snake River Valley in Minnesota (Caine, 1969:27-28, 101-102). Such points, according to Fox Valley evidence, may range from Archaic to Middle Woodland.

The two remaining stemmed points in the Currie collection (Plate 5, lower right) appear to be Durst Stemmed points, similar to those found in Wisconsin (Wittry, 1959) and the Snake River Valley in eastern Minnesota (Caine, 1969). Durst points are part of the Late Archaic assemblage in a number of Wisconsin sites and appear to some shortly following or contemporary with what Wittry has called Old Copper "without the copper."

The reamining points are ovoid in shape (Plate 5, upper right).

Two drills are present in the collection. One, made of mottled chert, has an expanding base, but the base is crude and unfinished (Plate 5, lower center). A second drill is made of quartzite and is ovoid in overall shape (Plate 4, right).

The scrapers, blades and other bifaces in the collection are all large specimens (Plate 4). As these specimens were attached to a display board, they could not be thoroughly examined, but four are circular to triangular in outline

and appear to be end scrapers. Two are of a half-moon shape and also appear to be scrapers. A slightly concave edge on one specimen gives indication of use as a spokeshave.

Two specimens were long, narrow blades. One of these is completely flat on the dorsal side (Plate 4, upper center). The remaining specimens are chopper-like tools.

It is impossible to assign any relationships to most of this last group of artifacts, as similar specimens elsewhere display a wide range of provenience.

Overall, the time range indicated by this collection for the St. Croix area in Minnesota probably spans the Late Archaic through the Late Woodland.

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SOME WISCONSIN HAFTED GRAVERS

Jon Erickson, Milwaukee Public Museum

During some recent work with Wisconsin projectile points, it came to my attention that a number of the specimens that were included with the points are actually gravers. Gravers are lithic tools with sharp, worked projections that probably had a number of functions, but are generally assigned the role of engraving tools for use on bone, wood, antler, shell or stone. In their most commonly identified form, gravers are made by merely retouching flakes, but in this instance each of the gravers was deliberately worked into a form suitable for hafting.

Within the first group of gravers here identified, there is a fair degree of morphological similarity (see figure 1). The blades of the gravers in this group are roughly triangular with nearly equilateral proportions. The shoulders on most are very pronounced with slight barbs appearing on some. The stems on all pieces within this group are slightly flaring and the bases are nearly straight showing minor variations between individual gravers in both the concave and convex directions. Grinding was noted on the lateral and basal edges of several of the specimens in this group, but it does not appear to be a predominant characteristic.

Figure 1. Hafted Gravers. Milwaukee Public Museum Collection.

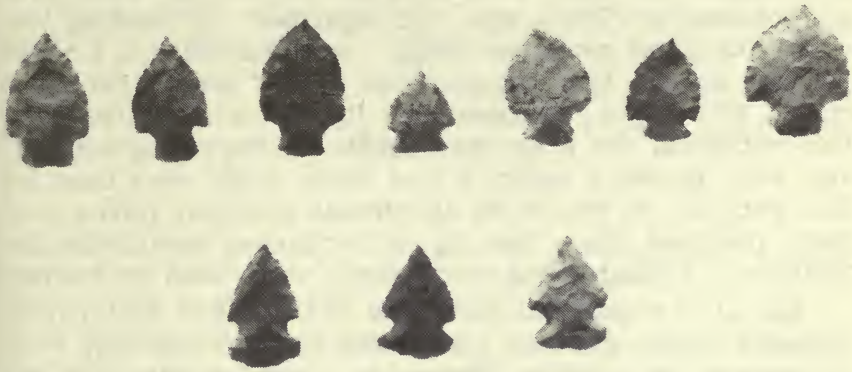

Figure 2. Hafted Gravers. Upper row: oblate-bladed. Lower: triangular side-notched. Milwaukee Public Museum Collection.

Size is another feature that shows similarity within this group of gravers. While the extremes range from 7/8'' to 1 1/2'' in overall length and 5/8'' to 1'' in shoulder width, the greatest number of length measurements cluster about the 1 1/4'' mark and the widths cluster around 7/8''.

Figure 2 shows another group of gravers that has been fashioned for hafting. This group contains two general varieties: those with ovate blades and those with a triangular side-notched outline. The ovate-bladed gravers show variations in stem form, but again the tendency is toward a slightly expanding stem. The bases on the entire group have a gently convex outline. Size of the ovate-bladed variety ranges from 1 1/8'' to 1 3/4'' in length with an average of about 1 9/16''. Widths average about 1 3/16'' at the shoulder. The three triangular side-notched specimens average 1 1/2'' x 1''.

Generally speaking, the appearance of these hafted gravers is very similar to that of projectile points. The real distinguishing characteristic and the functional focus of the tool is the sharp engraving tip. Careful examination shows that pressure retouch was used to produce a recurved outline which ends at the tip. In addition to the sharp engraving tip of the tool, another feature that may help in identifying hafted gravers is the location of the bulb of

percussion. Many of the specimens were made on flakes and utilize the flake's bulb of percussion for structural reinforcement. This was accomplished by making the engraving point near the "bulb," and it results in a cross section that is thickest near the graver end of the tool's blade. The extra thickness on the blade would help the tool withstand the pressures applied in engraving activity, and wear patterns indicate that these tools were used for this purpose. In two of the specimens alternate flakes have been removed from the tip to produce a burin edge and striations indicate that these tools were used as burins.

All of the gravers that have provenience date (which includes some gravers from each of the varieties) were discovered in eastern Wisconsin--more particularly the Fox River drainage system and the Milwaukee and Racine county areas. The general similarity of these gravers and their relatively limited distribution leads me to theorize that they may be a fairly prevalent type that has been lost somewhere in projectile point categories.

THE BOOKSHELF

PREHISTORIC BIOLOGICAL RELATIONSHIPS IN THE GREAT LAKES REGION. Richard Guy Wilkinson. Anthropological Papers, Museum of Anthropology, University of Michigan, No. 43. Thirty-three figures, 2 plates, 14 tables, 161 pages. Ann Arbor, 1971. $3.50.

During the past decade physical anthropologists have begun to question seriously the achievements of the "standard" bone report, usually found as an appendix in an archeological site report. Often the typical bone report concludes with a number of hypotheses (sometimes claimed as facts!) relating, e.g., to prehistoric migration patterns, or to the establishment of various physical types. More frequently, however, it consists of age and sex estimates, descriptions of continuous morphological characteristics (or how the individual "looked"), listings of measurements and indices, and calculations of the frequencies of discontinuous morphological traits. Statistical analyses are limited solely to univariate methods, including calculations of means, standard deviations, standard errors, coefficients of variation, etc. Testing procedures, when used, are likewise confined almost exclusively to t-tests and chi-squares. To the extent that the usually fragmentary and friable nature of the skeletal material allows, these methods may be appropriate and indeed all that is warranted. But univariate statistics are not capable of treating the individual as a "whole" organism belonging to a population, and the assessment of biological relationships, or distances, between populations must deal with "whole" individuals represented by complete data sets. One aspect of this problem was solved over 30 years ago by the Indian statistician, P.C. Mahalanobis, and the development in more recent years of high-speed electronic computers has enabled us to apply various multivariate statistics to skeletal data. Some of these methods are used by Wilkinson in an attempt to clarify the biological relationships between a number of prehistoric American Indian populations whose skeletal remains were excavated from sites in the Great Lakes area.

In the INTRODUCTION Wilkinson reviews briefly the

archeological and biological literature relevant to the relationships between Middle and Late Woodland and Illinois Hopewellian populations, and discusses the hypothesized "physical types" comprising these groups. This is followed by Chaper 1 (MATERIALS AND METHODS), which begins by defining the chronological positions and basic cultural characteristics of Early, Middle and Late Woodland populations. Each of ten sites from which the skeletal material was excavated is then discussed in terms of (a) geographical location, (b) chronological position, (c) number of burials in the sample and estimations of their ages and sexes, and (d) cultural affiliations of the site. This precedes a short statement on methods of age and sex determination, a list of the cranial and postcranial measurements taken and their respective indices, and a list of the discontinuous traits that were observed. A brief discussion of the computer program and statistical methods follows, and this leads to a rather fruitless attempt to justify the choice of measurements on the basis of different heritabilities of anthropometric characters as demonstrated by various twin studies. Wilkinson points out that most studies carried out so far along this line are inconclusive. The remainder of the first chapter consists of a short section on the variability of craniometric characters as indicated by coefficients of variation, in addition to a rather long discussion on the relative merits of using multiple linear regression analysis to predict the values of missing measurements.

Almost half of the monograph (excluding the APPENDIX) is contained in Chaper II (RESULTS). This chapter is divided into three sections. The first treats the results of the discriminant function analysis and attempts to indicate on the basis of cranial and facial variables the biological distances between groups. The second gives the results of profile pattern analyses where, through the use of T-scores and their correlation coefficients, Wilkinson tries to indicate graphically the similarities and differences in cranial shape between any two series of skulls.

The final chapter, SUMMARY AND CONCLUSIONS, is followed by an extensive APPENDIX that lists all cranial and postcranial measurements and indices. The monograph is completed with the BIBLIOGRAPHY and two plates, each of which shows, for no apparent reason, three views of a single adult male skull from two different sites.

Technically, the publication is disappointing. Typographical errors in the text occurred often enough to make one a bit apprehensive about the numerical data for which there are no checks. It is a bit disturbing, although minor, to see R.J. Berry's name misspelled throughout, but even worse is the fact that the measurements abbreviated BCW and BGW appear in no less than 20 graphs and in the APPENDIX, yet are not defined in the list of measurements (I suspect that they represent bicondylar and bigonial widths respectively, and if so, are mislabeled). The maps are poorly drawn and reproduced, and the figures are of variable quality, although most are readable.

I have one main criticism of the monograph, and caution the reader to be aware of it as he examines the material. At the very core of the report is the assumption that each of the 10 populations is represented adequately by a random sample of complete skeletons, and that the sample sizes are large enough for the proper statistical treatment. When one examines closely the raw data in the APPENDIX, however, and deletes those individuals for which there is extensive missing data, it may be noted that sample sizes are considerably less than 10 in all but the Knight Mounds. Furthermore, as Wilkinson notes on pp. 12-13, this population is hardly represented by a random sample. It consists only of well-preserved adults which do not even belong to a single temporal population. Practically speaking, there are good grounds for suspecting bias in this sample, as there is probably a general but positive correlation between robust, healthy individuals and good preservation.

I know of no answer to the problem of adequate sample sizes, but there are good reasons to assume that capitalization on chance and extreme BETA-weight fluctuation in cross validation studies via multiple regression analysis might be avoided if the sample size were equivalent to the square of the number of variables. In the present case, where 44 predictor variables are employed, extrapolation to the canonical variable coefficients indicates that slightly less than 2000 individuals might be required. On the other hand, it should be obvious that adherence to this method as a guideline for the determination of minimum sample size would prevent the analysis of any skeletal population found so far. Thus the problem remains open.

Wilkinson feels that his small samples (sometimes less

than five!) pose no great problem, however, and justifies in the following quotation (pp. 102-103) the adequacy of his statistical methodology on the basis of general agreement with existing archeological evidence.

> The results of this study further indicate that small samples can be dealt with quite adequately. The question of the accuracy and feasibility of the analysis must be answered in terms of the relationships previously established archaeologically. Thus if the results of the skeletal analyses point out at least some of the relationships which are evident culturally, we can assume that the methods are adequate for handling the data.

This concept of the validation of statistical procedures is a bit shaky, since there is always the possibility that prior studies are wrong. As an illustration, I might point out that when Wilkinson finds that his analysis of the non-metric variables disagrees with the metric analyses, he apparently reverses fields by stating (p. 95):

> It would seem that the use of these non-metric variables is not warranted with the restricted sample sizes available in this study. While the discriminant and T-score analyses are useful in dealing with all but the smallest sample sizes, the same is not true of the non-metric analysis, and the conclusions must therefore be based primarily upon the results of the metric analysis.

There are several less important comments that might be made. For example, in light of the prevailing view that discontinuous traits have at least a partial genetic basis, I cannot imagine why such irrelevant features as antemortem tooth loss and dental caries were included in the group. And with regard to the rather long section on profile pattern analysis, I would like to suggest that a more clear picture of the similarity of population mean profiles of cranial shape could have been obtained through the use of multivariate profile analysis for several groups.

In sum, Wilkinson offers one in a small series of recent attempts to analyze more meaningfully the biological characteristics of early human groups. For this he is to be commended. But I doubt seriously that his data are suf-

ficient for the statistical procedures he employs, and R.A. Fisher's comment in THE DESIGN OF EXPERIMENTS (Oliver and Boyd, London, 1951) seems particularly appropriate.

> Any brilliant achievement, on which attention is temporarily focused, may give a prestige to the method employed, or to some part of it, even in applications to which it has no special appropriateness.

Kenneth A. Bennett
Department of Anthropology
University of Wisconsin-Madison

INDIAN PEACE MEDALS IN AMERICAN HISTORY. Francis Paul Prucha. The State Historical Society of Wisconsin. 64 plates, xiv + 186 pages. Madison, 1971. $15.

> The practice of distributing Medals among Indians is as old as the first intercourse of the French with these people. The British continued the practice, and it has been followed by our own Government. . . .So important is its continuance esteemed to be that without Medals, any plans of operations among Indians, be it what it may, is essentially enfebled.

So wrote the Commissioner of Indian Affairs, Thomas L. McKenney, in 1829. Now the subject of his letters, the silver peace medal, has been examined in detail by Fr. Francis Paul Prucha, S.J. in his patiently awaited INDIAN PEACE MEDALS IN AMERICAN HISTORY.

In 1927 Bauman L. Belden gave us his INDIAN PEACE MEDALS ISSUED IN THE UNITED STATES. This publication, however, was basically an inductive study of surviving specimens in numismatic collections and was directed to the collector rather than the historian. Documentary evidence was used sparingly. With Fr. Prucha's new publication, we now have both sides of the coin fully examined. Divided into two basic sections, the first eleven chapters of INDIAN PEACE MEDALS IN AMERICAN HIS-

TORY treat the history of the medals as they were distributed by the government. A careful search of contemporary accounts, together with the related government documents in the National Archives, has resulted in a survey of the implementation of Indian policy and the initial importance of the peace medals thereto. The history of this practice reflects the changing emphasis in the relations between the government and the tribes. In the early days of the republic the medals were important diplomatic gifts given to cement alliances with tribal chiefs and influential warriors. With the decline of foreign influence, the practice degenerated in the post-Civil War era to mere awards for special services, and in instances the Indians were expected to reimburse the government for the medals. This change in emphasis is reflected by the declining numbers produced in the later years, and this is the subject of the second part of the book.

The second section of the book treats the actual design and manufacture of the medals from the earliest privately engraved varieties through the final stampings by the U.S. Mint in the 1890s. The National Archives has been gleaned of documents that relate to the processing of each presidential series as well as several of the fur trade "ornaments." Clear, actual size photographs of each size and type of medal enhance the text for this section. Numismatic buffs and archeologists alike will delight in the data presented on the number of medals each administration produced and distributed. For anyone interested in the diplomatic relations between the government and the tribes, especially the ethnological artifacts that influenced those relations, INDIAN PEACE MEDALS IN AMERICAN HISTORY is a must.

H. Michael Madaus
Assistant Curator of History
Milwaukee Public Museum

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WISCONSIN
ARCHEOLOGICAL SOCIETY

Vol. 53, No. 3
(New Series)

SEPTEMBER, 1972

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Milwaukee, Wisconsin

Incorporated, 1903

For the purpose of advancing the study and preservation of Wisconsin Indian Antiquities

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THE WISCONSIN ARCHEOLOGIST

New Series

MILWAUKEE, WISCONSIN - SEPTEMBER, 1972

Published Quarterly by The Wisconsin Archeological Society

AN ARTIFACTUAL REPORT ON THE FOSCORO SITE

Edward W. Wells

INTRODUCTION

The Foscoro site is picturesquely situated with Lake Michigan on the east, a bluff to the west and a bubbling creek winding its way through the greenery. This site lies on what was known as the Potawatomi Trail. This trail no doubt was well worn by much earlier cultures long before the Potawatomi Indians arrived.

A historically minded person familiar with this portion of the state would have but one thought in mind - prehistoric man must have paused here. For the past twenty years I have acquired proof that indeed he did!

During the historical era, the heavy growth of timber attracted three men - Foster, Coe and Rowe. In the 1860's these three men built a sawmill and pier for shipping forest products. They combined their names and called the rather short-lived hamlet - Foscoro.

Through personal communications with residents of this area (now deceased), I learned of the location of what they called a trading post which was no doubt a general store. A hostelry was also built in this vicinity during this period but burned to the ground in the late 1800's.

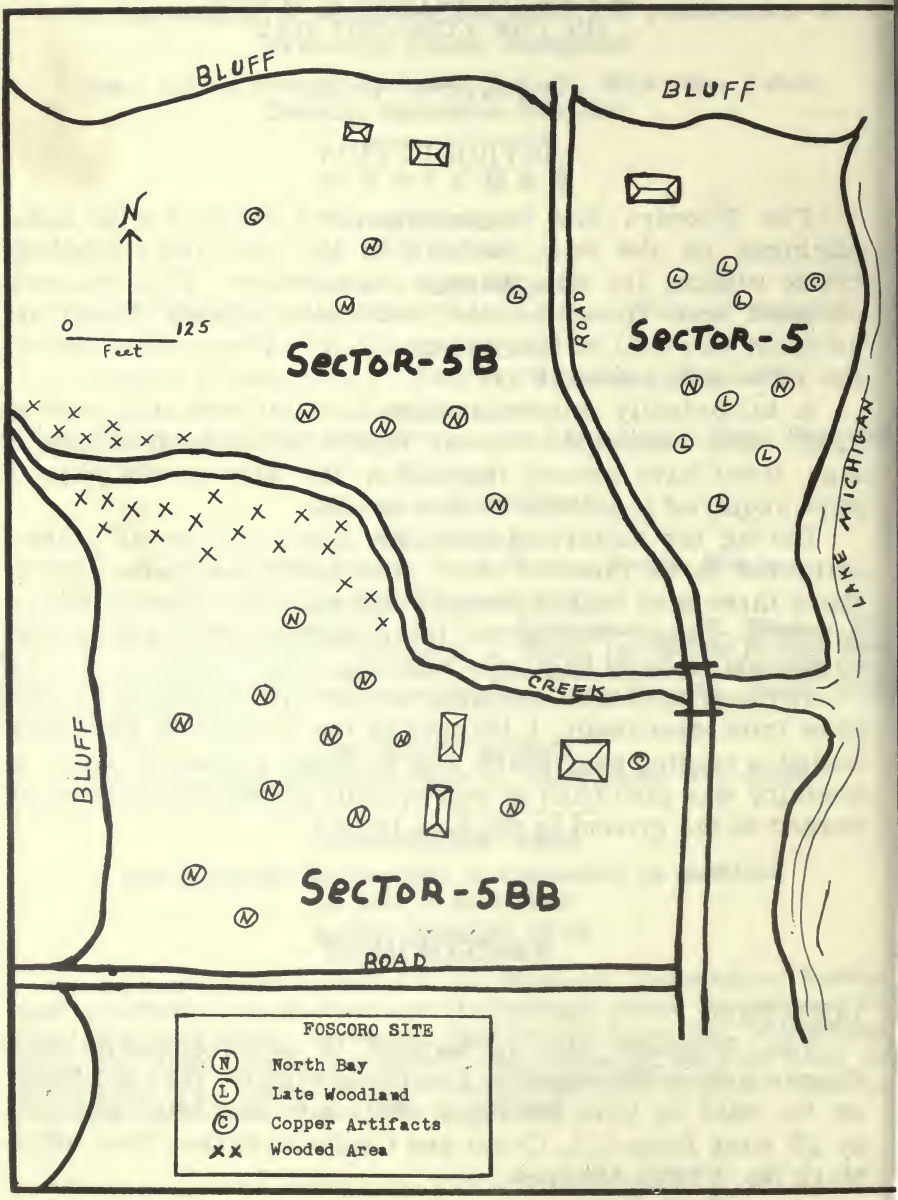
ENVIRONMENT

LOCATION

The Foscoro site is located in south-eastern Door County and north-eastern Kewaunee County. It is bordered on the east by Lake Michigan. This site lies 160 feet north by 20 east from U.S. Coast and Geodetic Survey Reference Mark No. I 1953 Ahnapee.

TOPOGRAPHY

A natural amphitheater has been formed by the flood plain and usual terrace as the river entered the lake through a gap in the bluff. The area involved in this report includes



a Nipissing beach and the flood plain terrace (Goldwait, 1907, p. 43).

It is obvious from the flood plain deposits that this creek was at one time considerably larger. Water flow remained constant even through the summer months during the 1800's. The Creek's Indian name was Senisippi - meaning stream of rocks (Holand, 1917, p. 442).

Figure 1. Historical artifacts of glass and china from sector 5 and 5BB.

COLLECTION

This site has been under cultivation sporadically for at least sixty years. The soil, a light sand to sandy loam, makes deep plowing rather simple. Many years of working the land has done a rather thorough job of mixing the cultural components.

This site is divided into three sectors of cultivation by the highway and the creek. Twenty years ago this land was again put under cultivation in portions. As they became available, I started a surface collection which eventually involved three sectors - 5, 5B and 5BB. All artifacts are catalogued in respect to the sector that they were found in.

As the years passed, it became apparent that more than one component was present. Granted permission by the owner, we dug several test trenches in a small remaining portion of the site that seemingly missed the plow, but these proved sterile. Troweling areas of heavy chippage down through and below the plow zone seemed to indicate the plow share had reached and disturbed all levels of habitation.

I have found no written reference of this site archeologically, though from the heavy concentration of cultural detritus, I am sure it would have been a very important one and much more enlightening prior to its cultivation.

HISTORICAL PERIOD

Cultural debris of 19th century vintage is prevalent in sector 5, the locale of a hostelry and sector 5BB where the so-called trading post once stood. Fragments of crockery, porcelain, china and glassware of blue, green and red hues number in the hundreds.

Fig. 1 depicts a few of the varieties of artifacts. A is rather interesting. It is made of china and represents an individual dressed in clothing common to the Eskimo, complete with fur parka hood. The figure is reposing in a bath-tub shaped enclosure which is three inches long. It was found in sector 5BB. B (from sector 5) is a doll's foot of china. Several fragments of dolls' heads were also found. C and D (both from sector 5BB) are fragments of a bowl or dish; the color is white while the trade mark stamp

is in black. An example of this stamp was found on a bowl at the Du Bay site (Abler, 1964, p. 130). E, F and G (from sector 5BB) are bottle fragments of clear white, pale green and amber color glass. H, I, J and K are also from sector 5BB; H is the rim and neck of a small ceramic vase; I and J are clear green glass bottle necks while K is a bottle neck of clear white glass.

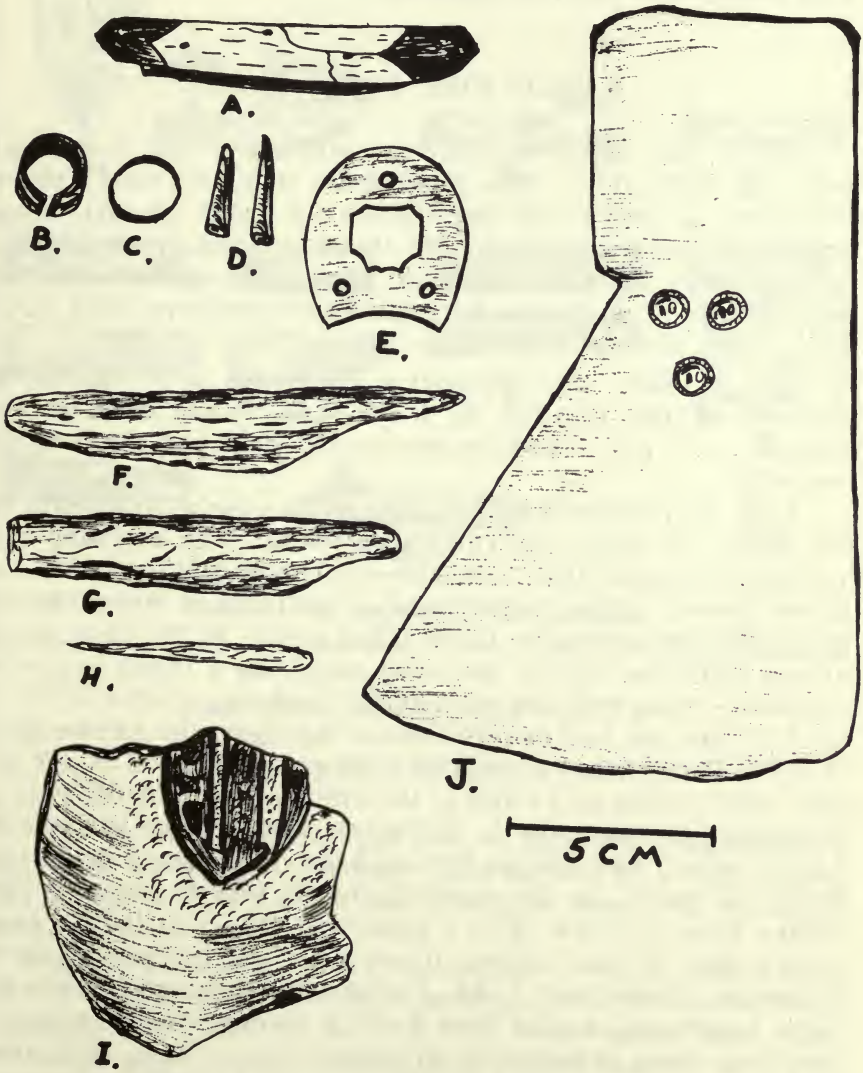


Figure 2. Metal artifacts from 3 sectors.

Objects of metal and portions thereof were numerous. A general inventory would include square iron nails, ox shoes, axes, ornaments and a great number of iron fragments rather impossible to classify.

Fig. 2A (sector 5) is a bone handled brass bound pocket knife. E and I are from sector 5BB; E is brass and resembles a boot heel plate; I is a fragment of an iron kettle; J is a fine example of an iron trade ax.

KAOLIN PIPE FRAGMENTS

White clay pipes are rather common to all historical sites in this area. The yield from this site shows more diversity of style and decoration. A total of sixty-nine fragments were found from the three sectors. Although this sample may be too small to draw any conclusions, the percentages from smoke hole measurements are 4/64 - 2%, 5/64 - 50%, 6/64 - 39%, 7/64 - 9%.

Fig. 3 shows representative examples from the three sectors of the site. A, B, G, H, I, L, M are from sector 5BB. C, D, F and J are from sector 5B. E, K and N are from sector 5.

A is an interesting specimen. It has embellishments in the form of bees encircling the bowl. The bowl top has vertical stamping that resembles corncobs. This pipe has a heavy brown patina resembling a well cured Meerschaum pipe. The smole hole is 6/64. B has a spur at the base and a stamp near the top of the bowl depicting a Dutch boy with shoulder yoke and two suspended buckets; smoke hole is 5/64. C has oak leaf decorations on the stem, the smoke hole is 5/64. D is a plain bowl with 6/64 smoke hole. E is a T.D. pipe with circle of 13 stars, the smoke hole is 6/64. F is a deviation as the core is jet black with a white slip about 1/32'' thick. The smoke hole is 6/64. G is also a deviation from the norm as the paste is brick red throughout. The smoke hole is 7/64. H is a stem with flange at the bit end; smoke hole 7/64. I shows obverse and reverse of stem fragment; smoke hole 5/64. J shows obverse and reverse of stem fragment; smoke hole 6/64. K shows obverse and reverse of stem fragment with smoke hole 6/64. L is a stem fragment, smoke hole 6/64. Two samples of this type were found. M and N have a smoke hole of 6/64.

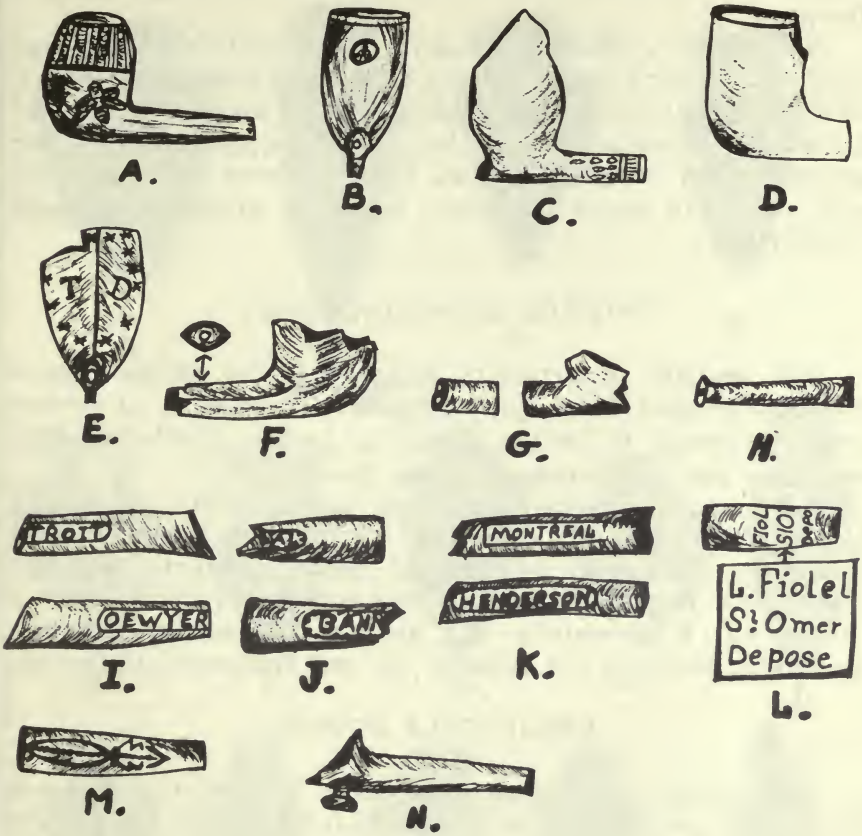


Figure 3. Pipe fragments from 3 sectors.

PRE-COLUMBIAN ARTIFACTS

SECTOR 5BB

This is the southerly portion of the site lying south of the creek on a Nipissing beach and backed by a high ridge. The majority of this site is now beneath a home and adjoining farm buildings.

My first contact with this portion was in 1951. To a person deeply interested in archeology, the first visit to such a site is like a shot in the arm. The heart beats faster and the brain runs rapid computations as you wonder what you may find and try to visualize the people who once inhabited

the area.

The surface showed a heavy concentration of chippage such as clusters of percussion flakes surrounded by cores, blocked out bifaces, and many broken shop rejects. Implements essential to produce this chippage were also prevalent for hammer stones were common throughout the site but were more prevalent near the areas of chippage clustering.

CHIPPED STONE INDUSTRY

The quality of artifacts included in the chipped stone industry grades from good to poor. The quality of the end product seems to be the result of rather nonchalant flint knappers and stubbornness of the raw material.

A recognizable trait exhibited in these artifacts seems to be a relaxed attitude and the lack of a rigid mental template. The yield of chipped stone artifacts was 321 specimens. Representative examples were projectile points (whole 80, fragmentary 50); knives (103 whole, 30 fragmentary); blocked out bifaces 40; and trimmed bifaces 18.

PROJECTILE POINTS

The predominant component from this sector is North Bay. The projectile points have variability of body form and hafting configuration very similar to those found at the Mero and Porte des Morts excavations (Mason, 1966; Mason, 1967).

The basic manufacturing technique was random percussion flaking. Occasionally, pressure flaking was employed to thin the edge or point. Twenty specimens have large or small remnants of striking platforms and many have knobs on one or both faces resulting from hinge flakes or stubborn crystalline inclusions in the stone.

Hafting elements include side notching, flare base and stems. The stems represent about half of all the points found including recognizable fragments. Fig. 4 shows typical point types. Due to their asymmetrical form, E and F may have been knives although the would-be cutting edge lacks usage scars or indication of wear. A, E and F are typical examples of flaking technique from the site.

G, J, K and M have a rather thick base with portions

Figure 4. Projectile points from sector 5BB.

of the striking platforms. H has a defect in the stone, the result being a sloppy shoulder and off center stem.

KNIVES

Knives from this sector are reminiscent of North Bay in form and flaking technique. They are also similar in form to those from other cultural components.

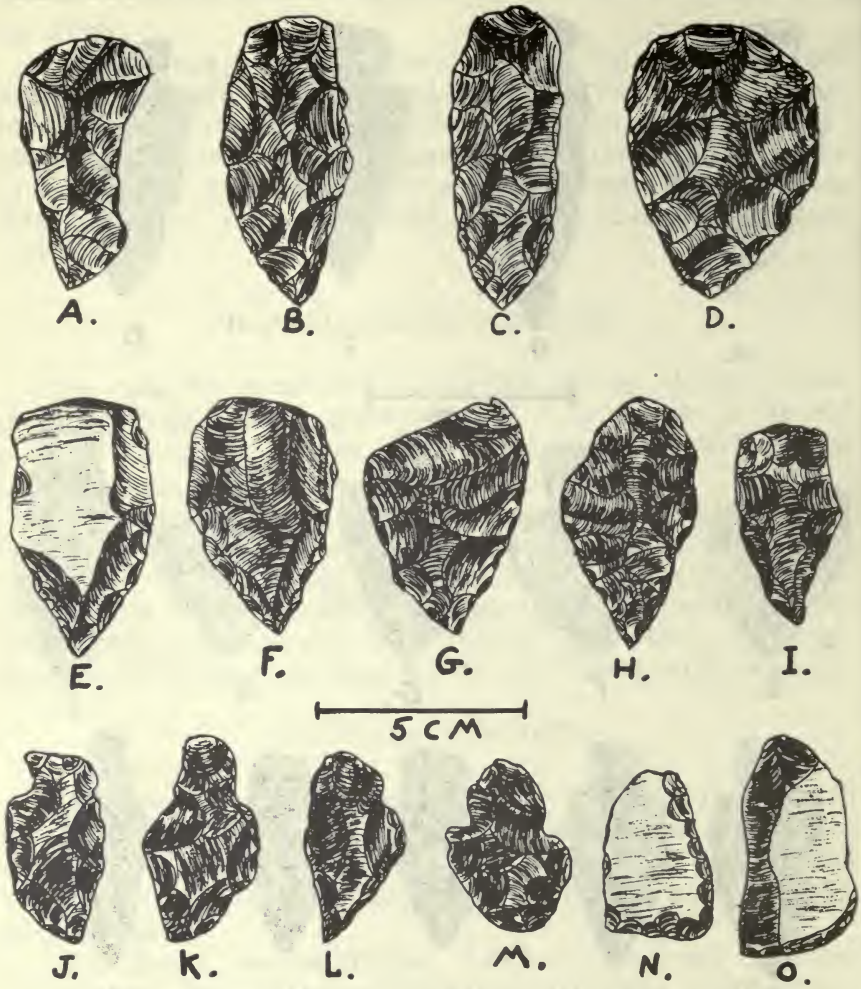


Figure 5. Uniface, biface and retouched flake knives from sector 5BB.

In many instances a biface was trimmed only to the extent to render it functional. Fig. 5 E is one of several uniface knives having the flat face of an unworked core.

B, C, D, F, G and H are typical of knives from this sector. They exhibit large percussion flakes and are rather thick in cross sections with some pressure flaking on the cutting edge. G has a crystal cavity on the face that has left a knobby eminence. There are examples of defects and crystalline deposits that result in a hole that passes through

the cross section.

Several examples of retouched flakes utilized as knives or scrapers were found. Two examples are Fig. 5 N and O.

CHOPPERS

Chopper implements common to the North Bay cultural context at Porte des Morts (Mason, 1967) were also common to this site. Twenty-seven specimens were found. Some representative examples are shown in Fig. 6. These

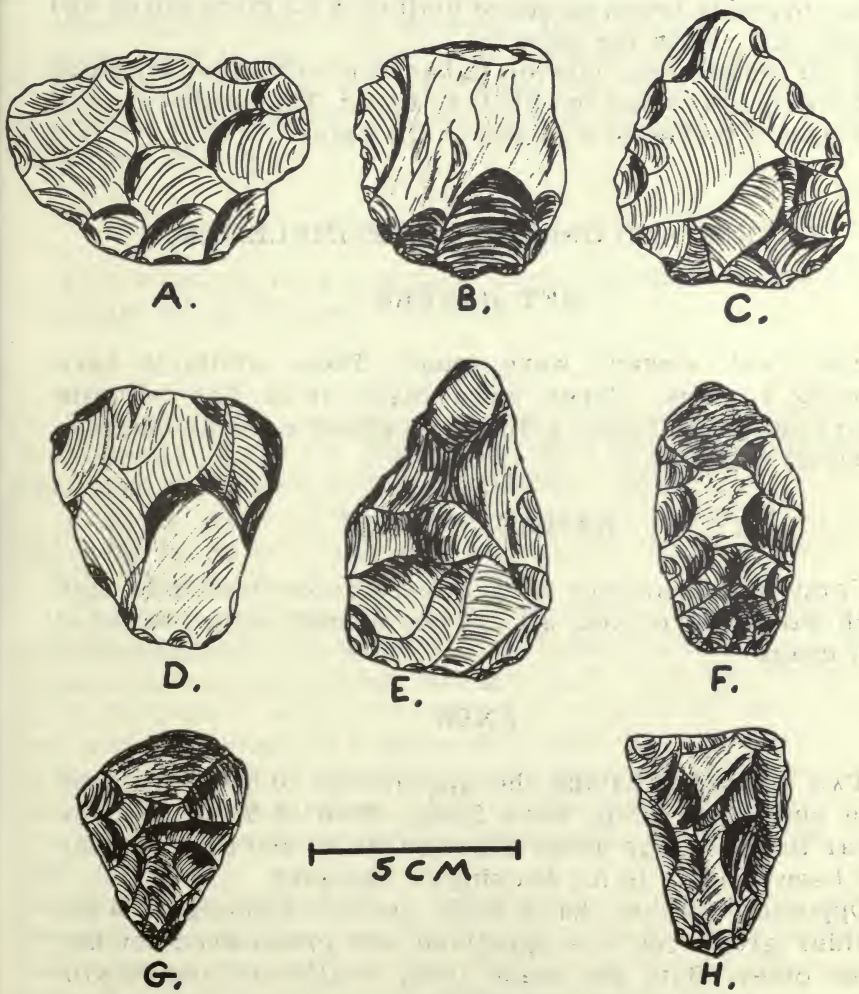


Figure 6. Chopper knives from sector 5B and 5BB.

implements are for the most part partial bifaces with large percussion flakes. Many exhibit the outer rind on the head indicating the source of material as a beach stone, which is readily available.

Fig. 6 B, D and G are modified beach stones. A, E, F and H are manufactured from flint common to this area.

LITHIC MATERIAL

Most of the artifacts in the chipped stone category are made from locally available Niagara chert. Other sources were obviously beach stones or drift rock for many cores and blocks still retain the rind.

Four hundred percussion flakes were recovered for study plus eighty cores and ten blocks of flint. The latter range in size from 4 inches to 6 inches in diameter.

PECKED AND GROUND STONE IMPLEMENTS

NET SINKERS

Four net sinkers were found. These artifacts have opposing notches. Three were made from flat dolomite beach stones, the fourth from a red granitic pebble common in glacial deposits.

HAMMER STONES

Forty-eight hammer stones were recovered. Hand size beach stones were used, all had one or more edges battered from usage.

AXES

Two examples having the appearance of a side notched ax in embryonic form were found. Both of these artifacts appear to have large usage scars on the bit and poll and may have been used as is for hacking or chopping.

Opposing notches have been pecked forming a weak shoulder groove on one specimen and pronounced notches on the other. Both are made from local beach stones with no attempt made to polish the face.

COPPER

One copper knife, Fig. 2 F, exhibiting heavy patina was found in the easterly portion of the sector. Near this knife were found two pieces of copper, 3 mm by 4 mm and 1 mm thick. The surface of these had green patina and appears to have been subjected to heat. The knife with adaptable tang would correspond to type A-1 (Wittry, 1951, p. 12). The North Bay concentration phases out in the area of these copper finds.

BONE REFUSE

Even after years of plowing, bone refuse was still present. Due to the mixing with the historical occupation levels, little could be done with this aspect. Sizeable fragments exhibited smooth saw marks, placing them in the historical period.

HEARTH STONES

Fire cracked hearth stones were prevalent in areas of chippage and sherd concentrations.

POTTERY

The pertinent ceramic complex from this sector is consistently North Bay ware. Identified types and varieties have been previously described (Mason, 1967).

For the sake of correlation, a brief summary of the characteristics of North Bay ware from the Foscoro site will be included here.

The ware is heavy grit tempered with 2 mm up to 20 mm crushed fragments of igneous rock. In most of the sherds the tempering agent protrudes through the surface. For the most part, the ware is thick and heavy with a range of 7 mm to 20 mm and an average of 9 mm in thickness. The inner surface is smooth but lumpy. Sherds having functional cord roughened exteriors exhibit haphazard orientations. One deviation from the norm is a vertical cord roughening on several neck and rim sherds.

NORTH BAY SCALLOP - (Sample size: 1 rim and 10 body sherds). Illustrations: Plate I A. Surface finish is smooth, color brick red with 2 mm to 7 mm grit tempering. All exhibit pseudo-scallop shell stamped impressions.

NORTH BAY CORD MARKED - (Sample size: 5 rim and 230 body sherds). Illustrations: Plate I B. Color brick red with 7 mm to 15 mm tempering. Sherds exhibit random cord roughened surface becoming vertical on neck and rim of the vessel. Sherd thickness is 8 mm to 20 mm from entire sample. B 1 and 2 are 19 mm in thickness.

NORTH BAY PLAIN - (Sample size: 50 body sherds). Illustration: Plate I C. Tan to brick red surface is smooth with

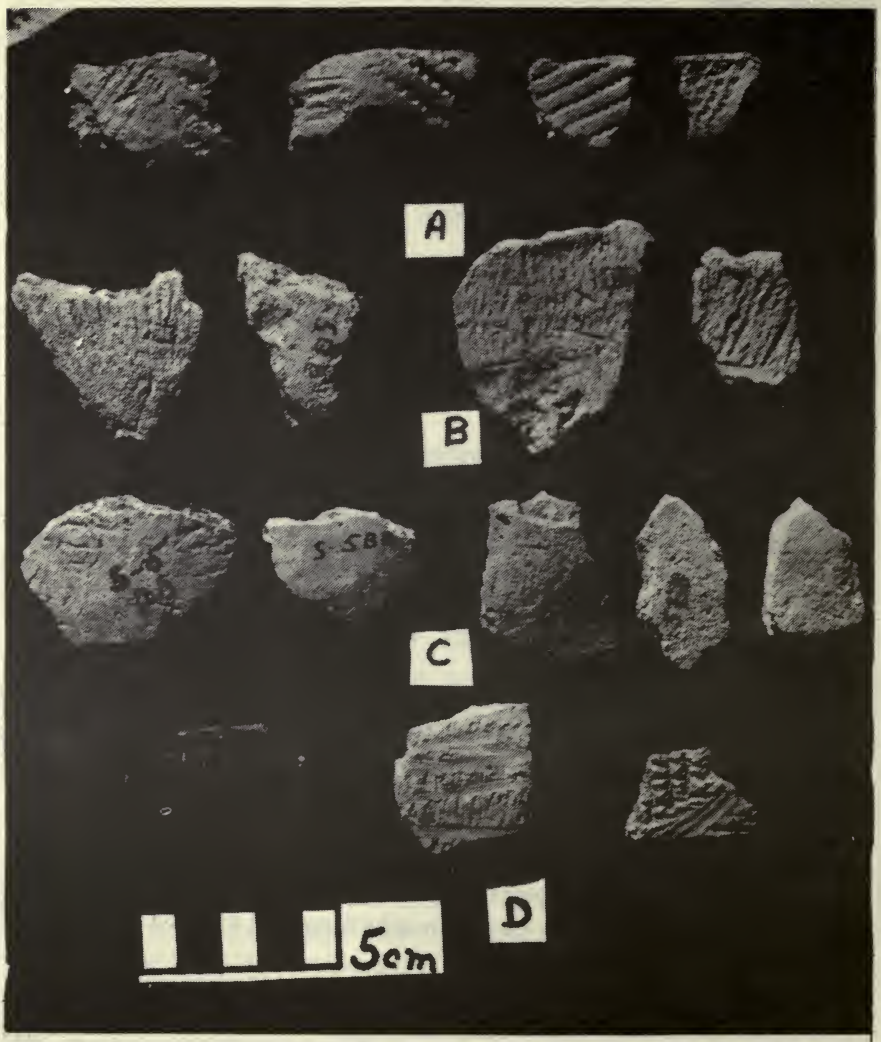


Plate 1. A-North Bay Scallop; B-North Bay Cord Marked; C-North Bay Plain; D-North Bay Corded Stamped (Pseudo-dentate).

grit size of 3 mm to 10 mm, sherd thickness being 10 mm to 19 mm.

NORTH BAY CORDED STAMPED (Pseudo-dentate) - (Sample size: 2 rims and 5 body sherds). Illustration Plate I D. Color of 1 rim is black, remainder of sherds are brick red. Tempering is angular grit 2 mm to 6 mm.

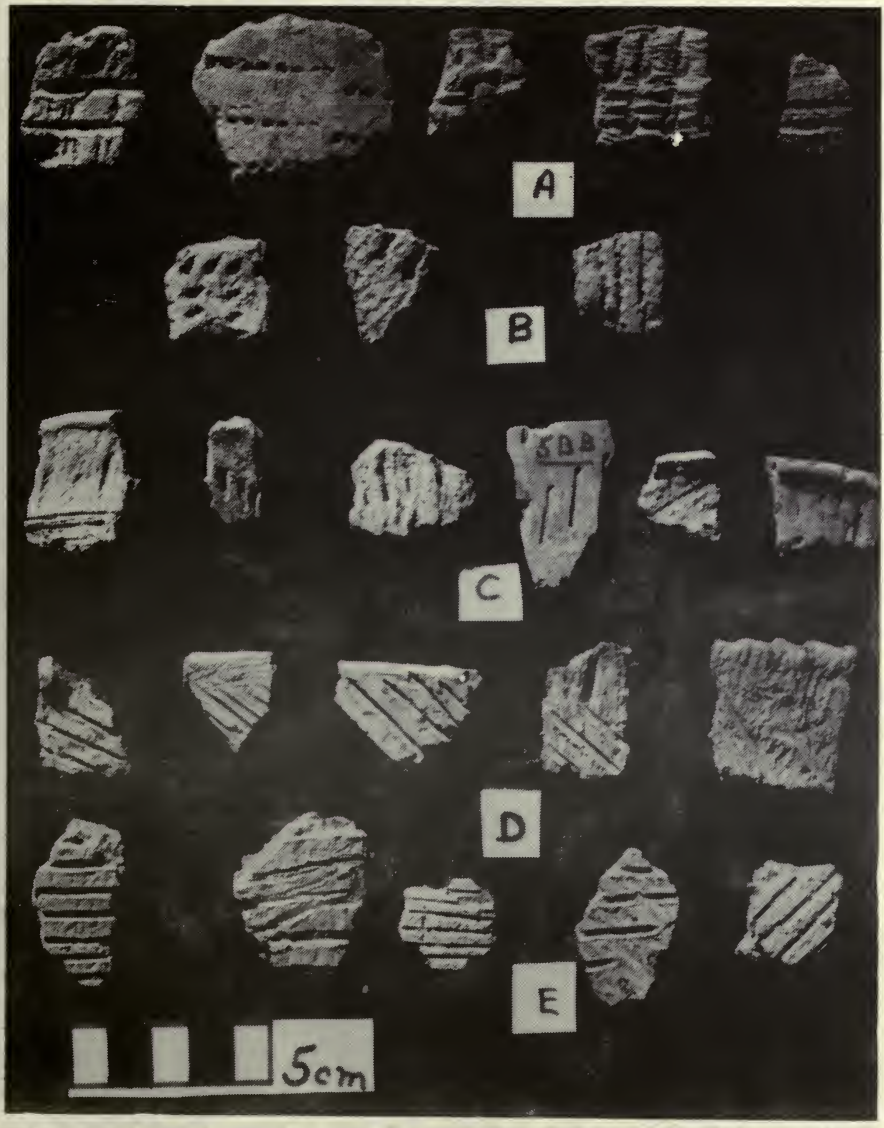


Plate 2. A and B-North Bay Dentate; C-North Bay Linear Stamped; D and E-Incised over Cord Roughened Surface.

Sherd thickness is 5 mm to 11 mm. The surface is plain or smoothed over cord roughened surface. Decoration is by application of cord-wrapped stick.

NORTH BAY DENTATE - (Sample size: 12 body sherds). Illustration: Plate II A and B. Paste is tan to brick red, sherd thickness 6 mm to 11 mm, the grit range is 4 mm to 12 mm. Two sherds have a smooth surface, the remainder have smoothed over cord roughened surface. Decoration is dentate stamping in the form of disconnected tooth imprints or segments of linear stamps.

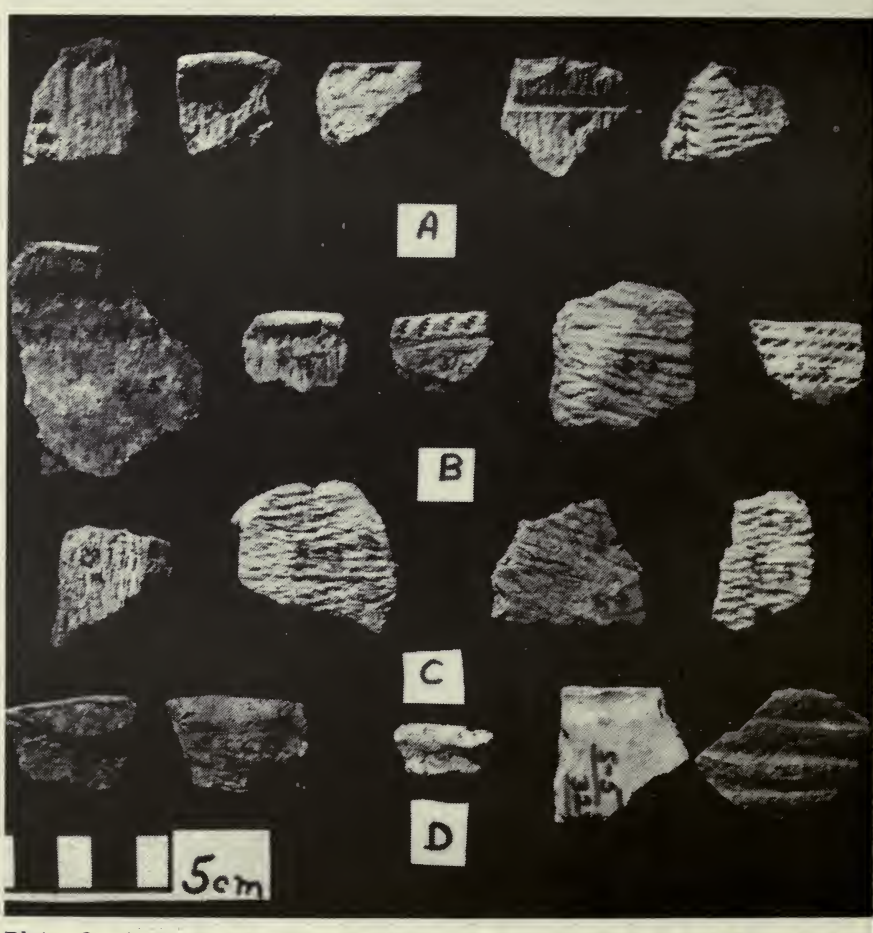


Plate 3. A-North Bay Stab-and-Drag; B and C-Heins Creek Ware; D-Late Woodland Ware.

NORTH BAY LINEAR STAMPED - (Sample size: 6 rims, 10 body sherds). Illustration: Plate II C. Paste has a color range from tan to brick red. Sherd thickness range from 7 mm to 11 mm. The grit range is 3 mm to 6 mm. The surface finish on two of the sherds is smoothed over corded surface. The remaining sherds exhibit a smooth surface. Decoration: plain linear stamps are the sole form of embellishments. They used a plain bar type stamp or roughly executed bar stamp leaving uneven edges.

DANE INCISED - (Sample size: 6 rim and 10 body sherds). Illustration: Plate II D and E. Color range from dark brown to brick red, sherd thickness varies from 7 mm to 12 mm. Grit range is 2 mm to 8 mm. Surface is smoothed over functional cord roughening. Decoration includes horizontal stacking of incised bands on body sherds and parallel diagonal incising up to lip on four of the rims.

NORTH BAY STAB-AND-DRAG - (Sample size: 2 rims and 5 body sherds). Illustration: Plate III A. The paste is brick red with sherd thickness of 8 mm to 10 mm. Grit size ranges from 2 mm to 4 mm. The surface of sherds exhibit cord roughening that has been smoothed over. Numbers 1, 2, 3 and 4 represent simple stab-and-drag. Number 4 shows complex stab-and-drag. The decoration on this sherd is possibly the result of a toothed tool.

SECTOR 5B

This is the north westerly section which is situated partially on the flood plain and on the incline towards the bluff. Cultural detritus seems to indicate a continuation of Sector 5BB. Chippage, flint cores and hammer stones were found in much less concentrated areas.

CHIPPED STONE INDUSTRY

The quality of chipped stone artifacts and attribute patterning from this sector indicates an extension of sector 5BB which lies across the creek.

The yield which is spread over a much larger area was 168 specimens. Examples were projectile points (whole 22 fragmentary 25); knives (whole 36, fragmentary 30); 3 retouched flaked knives; 6 blocked out bifaces; 4 trimmed

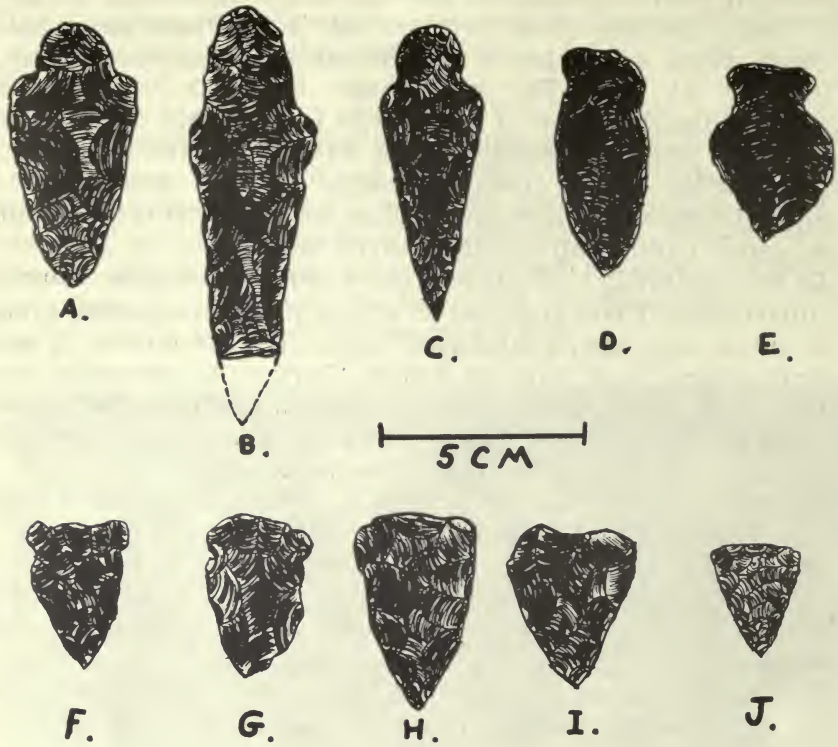


Figure 7. Projectile point types from sector 5B.

bifaces; 5 chopper knives; and 32 unclassified fragmentary mid sections.

PROJECTILE POINTS

The projectile points from this area are for the most part prototypes of sector 5BB. Hafting elements again include side notching, flare base and stems, the stemmed base being more predominant. Fig. 7 A and B are typical examples of form and flaking technique. Specimen C is an example of finer workmanship with the edges and base thinned to a greater extent than is common to the site. D, F and G are examples of the notched variety. E has the asymmetrical form of a knife but bears no indications of having been used for same. H, I and J are triangular points, the only ones found in this sector. They were found in the

eastern portion near the junction with sector 5.

KNIVES

Knives from this sector exhibited the same crudeness of style and could easily be of the same cultural component as sector 5BB. Representative examples are biface, uniface and retouched flakes. In many cases a rather thick biface was merely retouched on the cutting edge. Fig. 8 A, B, E and F are biface; C, D and G are uniface. H is a rather thick retouched flake knife.

CHOPPERS

Five chopper knives were found. All examples are partial

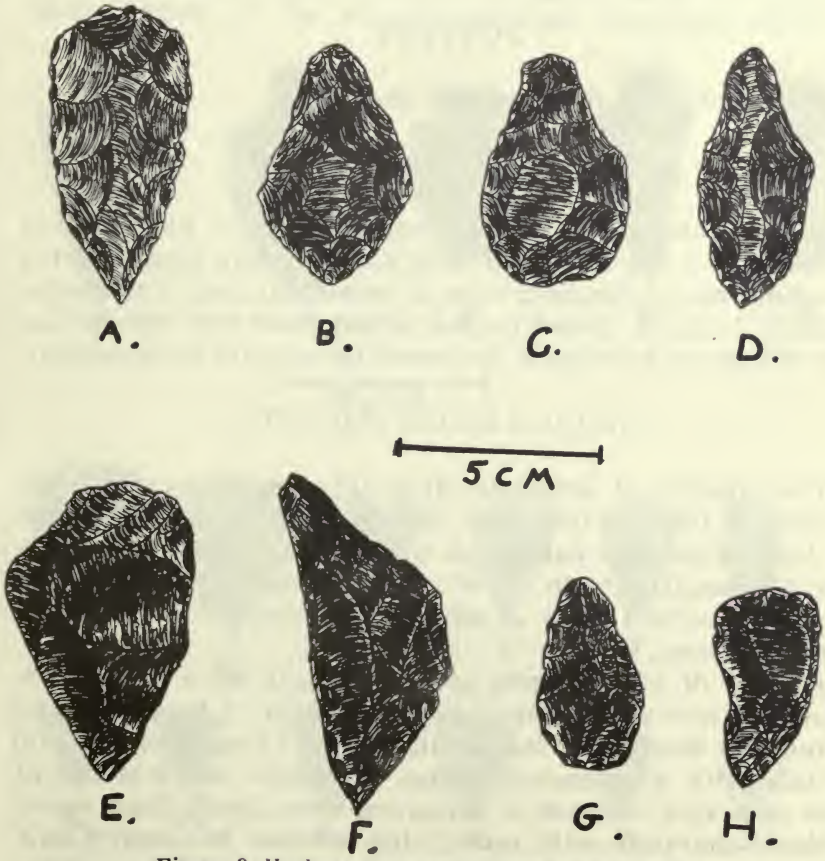


Figure 8. Various knife types found at sector 5B.

bifaces exhibiting large percussion flakes with usage scars on the cutting edge. An example is shown in Fig. 6 C.

HAMMER STONES

Twenty-three hammer stones were found. All of these implements are local beach stones, the only modification was the battered edges.

COPPER

Two copper specimens were found. One shown in Fig. 2 G is an adaptable tang knife. The other not shown is the socket tang from a spear or knife. Both of these specimens have a heavy green patina.

POTTERY

No pottery was found in this sector.

SECTOR 5

This sector lies on the easterly flood plain and is bordered by Lake Michigan. The soil is sandy loam bearing a medium heavy concentration of waste chippage and blocks of flint. Artifacts found in this sector have both Middle and Late Woodland attributes, the latter being more predominant.

CHIPPED STONE INDUSTRY

The quality of artifacts from this sector grades very similar in part to the other portions of the site, although the Late Woodland habitation of this section brings up the over all quality grade. Most of the triangular points found are well worked with secondary pressure flaking on the edges and base.

A total of 138 chipped stone artifacts were recovered. Examples are projectile points (65 whole, 6 fragmentary); knives (32 whole, 18 fragmentary) and 17 unclassified mid sections. 400 percussion flakes, 6 bifaces and 4 blocks of lithic material common to this area were found. Four cores of black quartzite with outer rind indicate the source as a beach or gravel stone. This no doubt was the source for

artifacts made from this material.

PROJECTILE POINTS

Seventeen stemmed points (including 11 whole artifacts and 6 fragmentary) and 8 notched points of apparent North Bay vintage were found. Fig. 9 A, B, C, D and E are typical examples. B is manufactured from black quartzite.

A total of 40 triangular points was found. Examples are shown in Fig. 9 F through Q. The quality grade is higher than the stemmed and notched points. Many had edges and bases retouched by fine pressure flaking.

KNIVES

The knives from sector 5 again have the general configuration of the Middle and Late Woodland tradition.

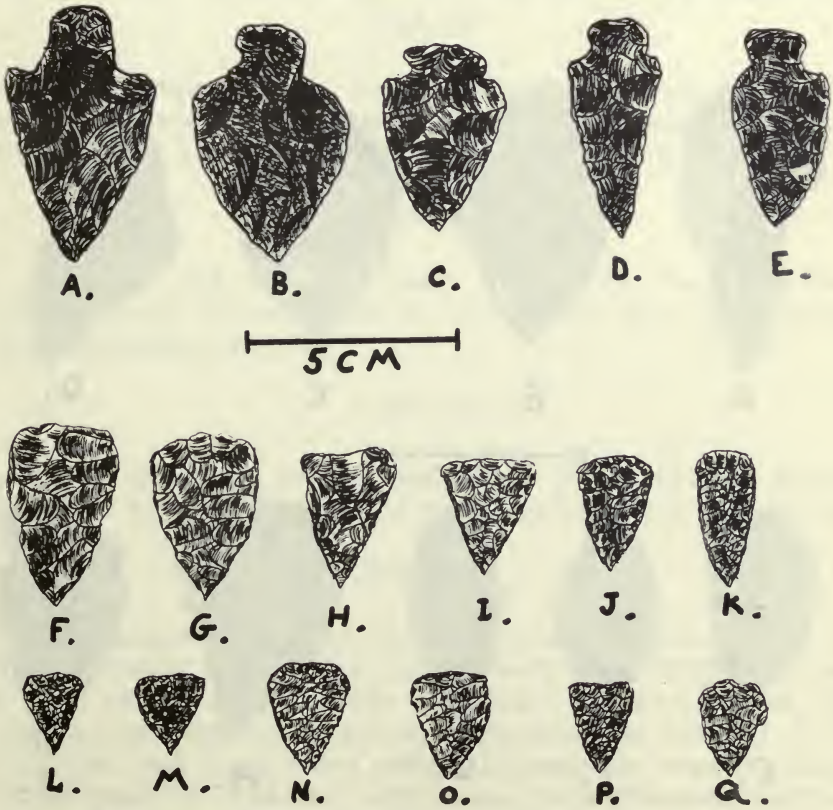


Figure 9. Stemmed, notched and triangular point types from sector 5.

They lack specialization of form that would differentiate them from other cultural components of this area. This is a characteristic also common to the Middle and Late Woodland deposits at the Heins Creek site (Wells, 1969). A variety of side, end cutting, scraping and retouched flake knives comprise the inventory.

Again the traditional trait is the manufacturing technique. For the most part they exhibit large percussion flakes and are thick in cross section. Fig. 10 A through I are typical biface knives. H has a crystalline defect in material resulting in a perforation at the base.

CHOPPER KNIVES

One chopper knife was found in this area. It is typical of those from the other two sectors.

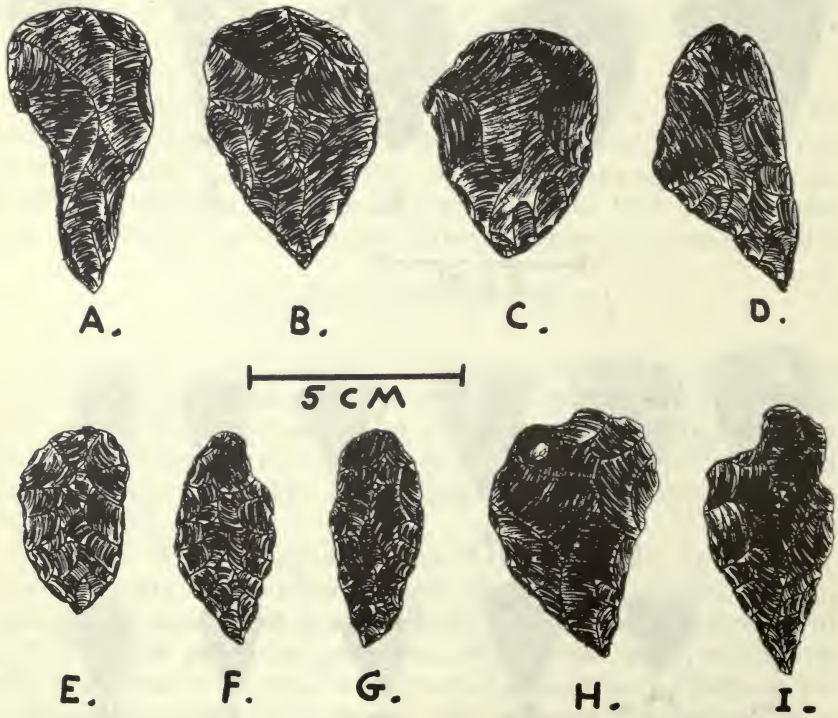


Figure 10. Knife types found at sector 5.

HAMMER STONES

Thirty-two hammer stones were found. All have battered edges; local beach stones were the source of material.

PECKED AND GROUND STONE IMPLEMENTS

AXES

One full grooved ax was found by my wife on the easterly beach portion where wave action had pulled it from the edge of the site.

CELTS

Three tapered poll celts were found, one had been polished. Two small polished, tapered, poll celts were also found at this site by Harry Dankoler (deceased).

NET SINKERS

Two net sinkers were found. These were manufactured from smooth dolomite beach stones, the only alterations being opposing notches.

PESTLES

Two roller type pestles were found. The end of one shows abrasive wear. The length of these pestles were 5'' and 7''

COPPER

Five copper artifacts were recovered, shown in Fig. 2. H is a copper awl with a rather heavy green patina. B and C are rings. B was made by folding and hammering the copper, thus thickening and strengthening the artifact. C is single ply and lacks heavy patina. D shows two copper cones called tinklers. The two specimens show the same degree of discoloration as C.

POTTERY

HEINS CREEK WARE - (Sample size: 9 rim and 120 body sherds). Illustration: Plate III B and C. Paste varies from dark brown to tan color, sherd thickness ranges from 4 mm to 10 mm. Grit size range 2-3 mm.

Nos. 1 and 5B are examples of the type Heins Creek Cord-Wrapped Stick. No. 5 has 4 bands of horizontal cord wrapped stick impressions. This ware from the Foscoro site is reminiscent of that found at Heins Creek (Wells, 1969, p. 16).

Nos. 1, 2 and 3B have corded stamped rims. The remainder of the sherds have undecorated cord marked surfaces (Wells, 1969, p. 11).

LATE WOODLAND WARE - (Sample size: 10 rim and 20 body sherds). Illustration: Plate III D. Twenty-two of the sherds have a near black paste, the remainder are light brown with average thickness of 5 mm. Tempering agent was grit with range of 1 mm to 3 mm. Surfaces of sherds are smooth. There is exterior thickening of the lip on D Nos. 1, 2 and 3. No. 5 represents three different vessels, all body sherds. These pieces exhibit horizontal fluting.

SUMMARY

The Foscoro site, like many others along the lake, has witnessed destruction as lands became available for development. The environment of this site is typical of many others in this area situated on the lake shore with a fresh running creek near or adjacent to it.

If bone refuse were available, findings would no doubt show heavy emphasis on fishing and hunting of local game.

To place each object in its proper niche, from an archeological aggregate of surface finds, is rather impossible. However, typology of many specimens leaves little doubt as to their cultural tradition.

The site was seemingly a desirable one from the broad time spectrum. Artifact placements indicate it was inhabited at least from Archaic through Late Woodland times. Although Early Woodland determinants are not certain, several projectile points are reminiscent of this era.

ACKNOWLEDGEMENTS

I wish to thank Mr. and Mrs. James Wolske for allowing me to do this research project on their property and Mr. and Mrs. John Petrina for allowing me to excavate test trenches on their land. I also want to express my gratitude to Roy Lukes who was kind enough to do all the photographic work necessary for my article

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BEAR-WALKING A SHAMANISTIC PHENOMENON AMONG THE POTAWATOMI INDIANS IN WISCONSIN

Robert J. Salzer
Logan Museum of Anthropology
Beloit College

INTRODUCTION

During the period from 1952 to 1959, the author conducted occasional weekend ethnographic field research among various groups of Forest Potawatomi Indians in Forest County, Wisconsin. This research primarily consisted of collecting notes, drawings, artifacts, and written statements by the Indians relating to religion, magic, shamanism, and mythology. Sustained contact with particular Indian people over this period of time resulted in deep personal friendship ties which were then and are now treasured by the author. These ties, coupled with the author's great interest in the Potawatomi lifestyle and philosophy, resulted in the author's formal adoption into the Eagle clan in 1956-58.

The description of BEAR-WALKING contained in this report represents the analysis of data collected from three informants. Discussions with these individuals concerning this shamanistic phenomenon usually began with statements like: "It is not good to talk about this," or "We will not talk about this today because there are thunderclouds in the sky." The Potawatomi do not like to talk about religion or magic in the presence of outsiders, new acqaintances, or white men, and I believe that the special personal relationships between the author and the Indian sources were instrumental in making the collection of these data possible. The author is grateful for this trust since, to the informants, there is great personal risk for them and their families in open discussions of this particular shamanistic phenomenon.

THE BACKGROUND

The Forest Potawatomi Indians now living in Forest

County in northern Wisconsin represent a selected relict group of Wisconsin's aboriginal populations. When the Potawatomi were removed to Kansas during the mid-to-late 1830's, the bulk of the individuals in the forced migration had been residents of southern Wisconsin and nothern Illinois, the so-called "Prairie" Potawatomi. The "Forest" Potawatomi lived in the heavily forested area of central and northeastern Wisconsin and were excluded from the removal program, probably because they were difficult to locate.

At the present time, those Potawatomi who are living in northern Wisconsin and Upper Michigan are scattered in areas near several small white communities. They are, however, remote from the areas of heavy modern tourist developments. These two factors have contributed to a degree of isolation from, and marginality to, the forces which have been significant in the acculturation of other resident aboriginal groups in the state. Local political organization is not well developed, due no doubt to the scattered settlement pattern, the breakdown of traditional leadership roles, and the fact that potential leaders in recent years have followed the widespread pattern of emigration to large urban centers for economic purposes.

The Forest Potawatomi have not been studied extensively. This is unfortunate for many reasons, not the least of which is the obvious fact that considerable differences can be found between the Forest Potawatomi and the relatively well-studied Prairie Potawatomi groups. It is also unfortunate because small population size, scattered settlement pattern, and immigration are all contributing to rather large-scale disruption of what is left of earlier life styles. A reasonably accurate account of the modern Forest Potawatomi can be found in Robert E. Ritzenthaler's 1953 monograph.

The Forest Potawatomi regard themselves as being conservative and "traditional" and, to a large extent, this is a fair self-appraisal. In part this is due to their relative isolation from direct white influence and in part it is due to the modern and traditional self-image of the Potawatomi. Contemporary informants are quick to point out, for example, that the Potawatomi language has been highly resistant to change as compared with that of their neighbors, the Ojibwa (Chippewa).

Potawatomi religion is at present a mixture of the aboriginal Medicine Lodge and the more recent Dream Dance Much of the ceremonial activity has been abrogated due to loss of personnel and small population size, coupled with attempts to maintain the "old" or the "pure." Shamanism is apparently present, although it is difficult to estimate whether it is declining or increasing in importance due to the general and widespread hesitancy or even resistance to discuss such things. Modern or recent shamans of various kinds appear to move with ease from Potawatomi to Chippewa and Menomini groups, and this pattern is undoubtedly a corrollary of a more widespread pattern of mobility.

BEAR-WALKING is a shamanistic phenomenon which is, or at least until very recently was, present among the Forest Potawatomi. In 1957 the author collected a medicine bundle which belonged to such a shaman and, as a part of the collecting procedure, the author attempted to have its contents identified. Drawings which related to Bear-Walking were also collected. Since this specific form of shamanism had not been reported previously, and, since the documentation obtained is unusual, the author felt it desirable to record these data.

The bundle came into the author's possession after the death of Mr. A. Earl Buckman, who had had possession of the bundle until the time of his death. Mr. Buckman was a quarter-blood Ottawa Indian who had been adopted into the Potawatomi tribe sometime around 1949. He was adopted as the brother of the then chief, James Waumego Mexico, Jr., and Buckman had apparently obtained the bundle from his adopted brother. The bundle had originally belonged to William (Bill) Mexico (Kitchi-Keshick), who apparently was a biological brother of James Mexico. Kitchi-Keshick is alleged to have been a Bear-Walker, and is said to have been born in 1844 and died in 1948.

The account of this particular bundle was related to the author on several occasions by Mr. Buckman during the period from 1954-56. Mr. Buckman had obtained his knowledge of the bundle from James Mexico.

THE BEAR-WALKER BUNDLE AND ITS CONTENTS

The following descriptive inventory is intended to identify each of the items in the bundle and to describe the use of those items for which a use is known.

1. The BUNDLE itself is made of the untreated skin of what has been tentatively identified as that of a badger. The skin was sewn into a rough rectangle (31.2 x 18.2 x 10.5 centimeters) with heavy black thread in such a way as to allow the animal's tail to form a covering flap. The flap may have been attached to the main part of the bundle by means of a wire loop. The bundle has a short tab of heavy harness leather at each end and these may represent portions of a shoulder strap which once was on the bundle (see drawings). The inside of the bundle is lined with a white tailored cotton insert which has been sewn to the skin by means of a heavy white thread. (Figure 1)

2. "MAN'S BUNDLE." This separate bundle is not necessarily a part of the Bear-Walker's equipment. Many people, aside from Bear Walkers, apparently have such a "man's bundle." It consists of a miniature bow and four arrows which are wrapped in green cloth and tied together

Figure 1. The Bear-Walker bundle.

by means of a green ribbon. The bow is a small (36.2 x 1.5 x 0.55 cm) version of a "medicine"-type bow, and has a scalloped edge. It appears to be made of ash. The belly of the bow is painted with green pigment, the straight edge is painted red, and the scalloped edge is painted alternately red and blue. The handle is left plain. There are two "hunting" arrows (bunts) in the bundle. These are 21.4 and 21.7 cm long. The heads are enlarged and blunt and are painted red and green. The shafts are unpainted and the area around the nocks is painted green. There are also two "war" arrows (22.8 and 22.8 cm long). The heads on these are slightly enlarged and are quite pointed. The heads are painted blue, the shaft is unpainted, and the nock area is also painted blue.

Mr. Buckman said that the "man's bundle" is used to inflict injury on an enemy. A doll or other representation of the potential victim is constructed and is "shot" with a hunting arrow if the intention is to cause injury to the victim in a hunting "accident," or it is shot with the war arrows if death or injury in battle is the desired objective. (Figures 2 and 3)

3. "DOG DANCE BUNDLE." This bundle is part of the Bear-Walker bundle proper and consists of a series of great horned owl, barred owl, marsh hawk, and raven wing and tail feathers which are strung on a string. One raven feather has a purple ribbon inserted in the quill. Most of these

Figure 2. The "Man's Bundle," assembled.

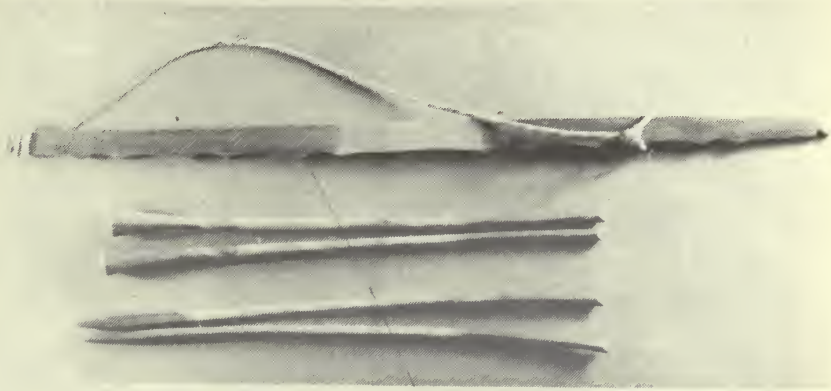


Figure 3. The "Man's Bundle," unwrapped.

feathers have been stripped from their quills. A second unit consists of a small bundle of 5 Cooper's hawk feathers which are tied together. The Dog Dance bundle also includes portions of what appear to be the tails of domestic cows. The entire bundle is tied with a blue cloth strip to which a deer dew claw has been attached by means of a buckskin thong. The bundle is tied a second time with a smoke-tanned buckskin thong.

I have no information of the use of this bundle. (Figure 4)

4. "WISKA'S HAIR ORNAMENT." This is a long (ca. 34 cm) strip of smoke tanned buckskin which has a series

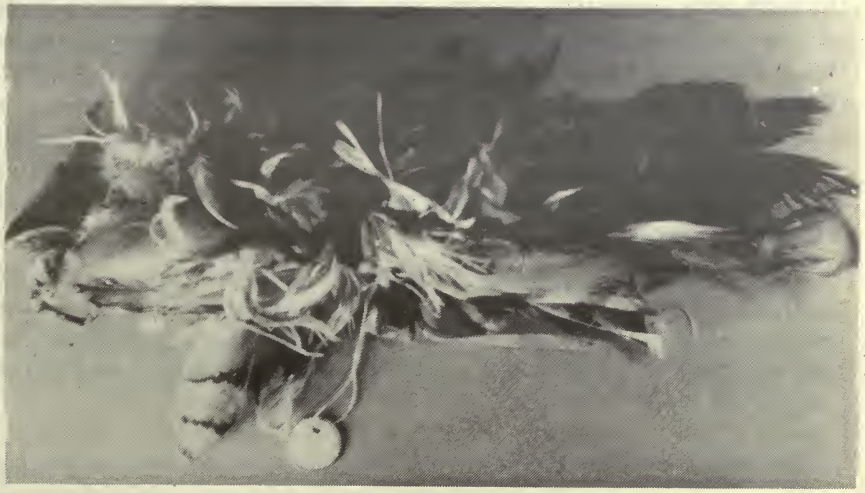


Figure 4. The "Dog Dance Bundle."

Figure 5. "Wiska's Hair Ornament."

of longitudinal slits along its edges (spaced about 3.4 cm apart). Ten wing and tail feathers of what may be peregrine (duck hawk) falcon are attached to the thong by means of the slits at one end of the object. The other end has a long (3.1 cm) slit in it and is devoid of feathers.

Mr. Buckman said that this is a hair ornament and is worn by attaching it to the hair by passing a lock of hair through the long slit at one end. Wiska is the culture hero of the Potawatomi. The hair ornament was worn by the Bear-Walker before and during the casting of spells. (Figure 5)

5. Small bundle consisting of a lump of blue chalk wrapped in a portion of a waxed bread wrapper (Schlafke's Bakery in Wabeno, Wisconsin).

The chalk is simple plumber's chalk. Mr. Buckman indicated that it was used as a source of blue pigment, presumably for face paint. Blue paint among the Potawatomi is a symbol of leadership - ordinary people wear red paint. (Figure 6, A)

6. SUCKING TUBE. This is made of a short (8.4 cm long) section of a domestic cow's horn. It is the tip of the horn and

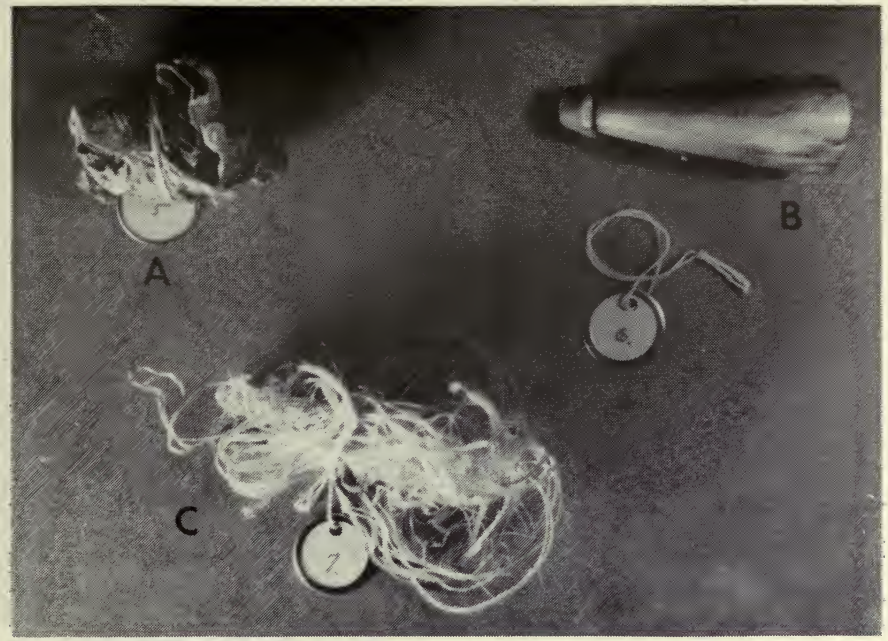


Figure 6. Blue chalk bundle (A); Sucking tube (B); sinew (C).

it has been hollowed out and a hole was drilled at the tip to join with the hollowed interior. There is a carved lip at the small end. The tube is decorated with incised geometric designs, although the incisions have been partially worn away by use. The object has a moderately high polish.

Sucking tubes like this are found in all sorts of medicine bundles. Mr. Buckman said that such tubes were used to magically draw out evil spirits which may be causing minor aches and pains. Under these conditions, the object can be inferred to have been used for curing particular illnesses. If so, apparently not all of the activities of the Bear-Walker were evil or designed to inflict injury. (Figure 6, B)

7. SINEW. A small unfastened bundle of sinew was included in the Bear-Walker bundle. The sinew appears to be from a deer and has been shredded in preparation for use.

Presumably, this is not a magical item and it may simply be carried for repairs of other objects when and if needed. (Figure 6, C)

Figure 7. Red plume (A); Miniature war club (B); "Sky drum (C).

8. A dyed red fluff-type feather, possibly from an eagle. I have no information on its use. (Figure 7, A)

9. WAR CLUB. One miniature (18.1 cm long) ball-type war club was included in the Bear-Walker bundle. The ball is oval (3.2 x 2.6 cm). The handle portion has been carved into what appears to be an eagle's head at the point where the handle and ball portions junction. The entire object has been blackened by fire, making it difficult to determine the sort of wood of which it is made.

Mr. Buckman said that this artifact was carried into battle in order to enhance the fighting capabilities of the Bear-Walker. (Figure 7, B)

10. "SKY" DRUM. This is a miniature tambourine-type drum with free-type (not snare-type) rattles inside. It is made in the Potawatomi style with a single skin folded to form both heads. The stitching of the heads is done with sinew and the heads themselves appear to be made of deer rawhide. The drum is embellished with a string-wrapped

rawhide loop handle along the edge. It is unpainted and undecorated. Dimensions: 15.8 x 14.5 x 1.6 cm thick.

Mr. Buckman said that, when pursued by enemies, the Bear-Walker would beat this small drum. The sound of the drum would be magically amplified so that his enemies would hear many loud drums and, hopefully, conclude that the Bear-Walker had somehow been reinforced by many drummers. (Figure 7, C)

11. HORSE. This finely-carved pine horse has a red painted body and the head and tail portions are painted black. A single strand of red yarn is tied tightly around the neck immediately below the head. The wooden tail originally had two or three strands of black horse hair loosely tied to it, but these have been lost. There is a small perforated metal (brass?) tab inserted into the wood immediately behind the head and on the top of the neck, possibly for purposes of suspension. In addition, there is a small shallow carved hole in the front of the chest area, located about midway from the feet to the head. The horse is 8.25 cm high, 13.8 cm long, and 3.45 cm wide.

Mr. Buckman said that this artifact was associated with spells involving horses. If, for example, the Bear-Walker's enemies were pursuing him on horseback, the Bear-Walker would rub the legs of the sculpture and this would in turn cause the legs of his pursuers' horses to become weak and the horses would stumble and fall. It is interesting that the sculpture is made in such a way that the horse has disproportionately short legs. There are scratches on the bottom of the "feet" of the horse. (Figure 8, B)

12. SMALL HORSE. This is similar to the larger horse, but is much less carefully made. It is carved of pine, it is smaller, it has traces of red pigment on the body, and it also has disproportionately short legs.

When I asked Mr. Buckman what function this artifact might have served, he shrugged his shoulders and suggested that it may have been a "spare," and used when the larger horse no longer functioned well enough. This is not satisfactory as an explanation and I believe that Mr. Buckman was guessing. (Figure 8, A)

13. BEAR'S EARS. Two small bear's ears, which are

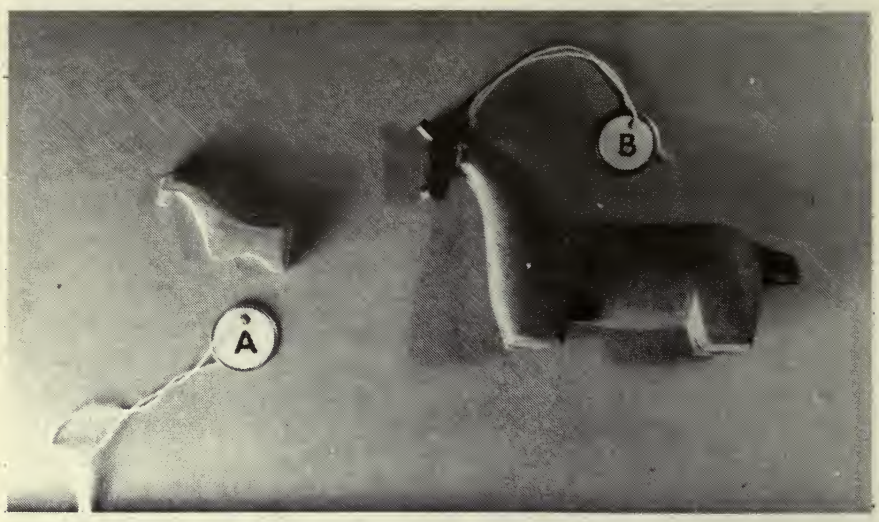


Figure 8. Small horse (A); Horse (B).

tied together by means of a heavy black thread, were also included in the bundle.

No information was available on the use or purpose. (Figure 9)

14. DEW CLAW RATTLE. This is a fairly common sort of rattle and is made of twenty deer hoof-tip and dew claws which are attached to a weeden splinter handle by means of smoke tanned buckskin thongs. There is one small strand of blue beads which is loosely attached to the handle, and several fine threads are wrapped around the handle in the area of the "dew claws" which may represent additional beadwork which may at one time have been present. The top of the rattle (the protruding portion of the wooden handle) has been carved to represent some sort of design.

Mr. Buckman indicated that this rattle was used in a very special manner and in conjunction with the deer call described below. (Figure 10, A)

15. DEER CALL. This is a two-piece carved maple deer call. Its two pieces are loosely held together by a length of chalk line in such a way as to suggest that the chalk line may have also functioned for purposes of suspension. The two pieces, when joined, have a length of 12.5 cm. The noise-maker consists of a thin metal reed.

Figure 9. Bear's ears.

According to Mr. Buckman, when a Bear-Walker wishes to communicate with a person who is beyond shouting distance, he does so by first using the deer call. This is supposed to sound like a fawn in trouble, and it attracts the attention of any does in the vicinity. Once attracted, the Bear-Walker begins to shake the dew claw rattle and, at the same time, he repeats the message. The does carry and transmit the message to its ultimate recipient. Mr. Buckman did not know the manner in which the message was received. (Figure 10, B)

16. MODEL CANOE. This canoe model is 24.9 cm long and 6.2 cm. wide, and has what appears to be a representation of an otter on the right side of the prow. It is carved from

Figure 10. Dew claw rattle (A); Deer call (B).

pine and has three large notches scraped into the sides of the hull: one notch on the right side, the other two on the left.

Mr. Buckman said that, if the Bear-Walker was pursued by enemies in canoes, he could magically cause their canoes to sink by cutting holes in the canoe model. (Figure 11, A)

17. SMALLER CANOE MODEL. This artifact is carved from what appears to be black walnut and it has a configuration which is similar to that of an aboriginal dugout, rather than birchbark, type. It is 20.9 cm long, 3.4 cm wide, and has no prow design.

Mr. Buckman did not know what this item was used for, but we jokingly suggested that it might be a "spare." (Figure 11, B)

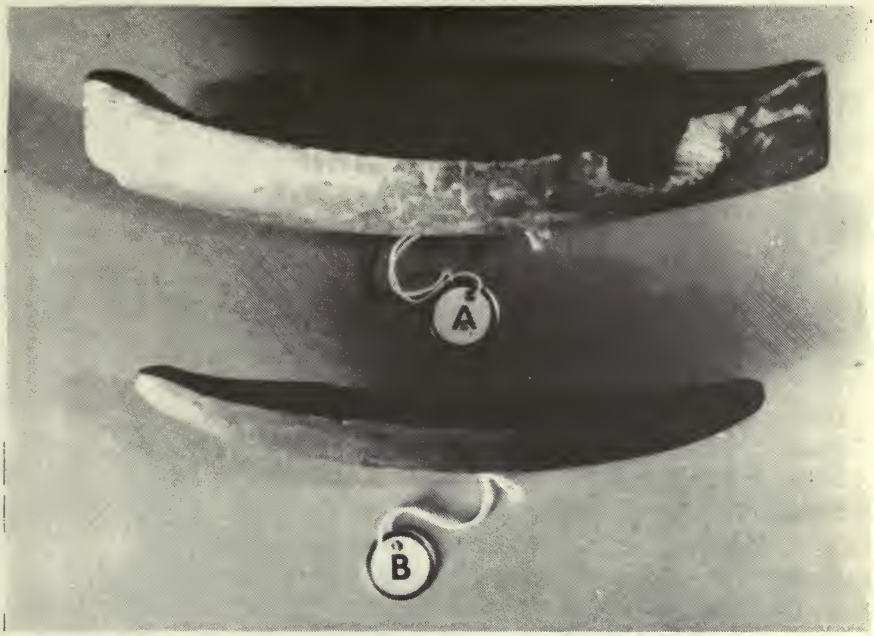


Figure 11. Model canoe (A); Smaller model canoe (B).

18. (a and b) BEAR TEETH. A pair of black bear canine teeth are included in the bundle. The teeth have polished roots and appear to have come from a rather large animal.

Mr. Buckman indicated that the Bear-Walker could call on the aid of wild bears if he wanted to cause a person to be attacked by a bear. These two teeth were used in casting such a spell. (Figure 12, B)

19. BLACK BEAR'S EAR BUNDLE. This small pocket-type bundle is made from a black bear's ear and it measures 7.3 x 6.2 x 2.6 cm. Inside is a rolled strip of (unborn?) fawn skin. Inside the fawn skin is a rolled strip of green paper. Inside the paper is a small seed pod (bur).

No known use. (Figure 12, A)

20. BLACK SQUIRREL BUNDLE. This skin was gathered in the middle and tied with a smoke tanned buckskin thong. Inside is what appears to be a mixture of red ochre and herbs.

No known use. (Figure 13, A)

Figure 12. Black Bear's ear bundle, unwrapped (A); Bear teeth (B).

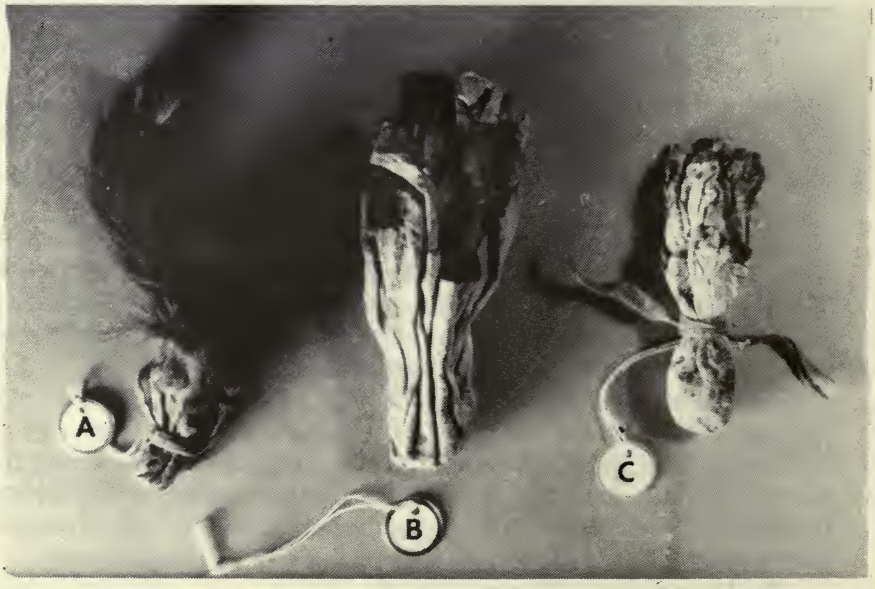


Figure 13. Black Squirrel bundle (A); Untied bundle (B); Skin bundle (C).

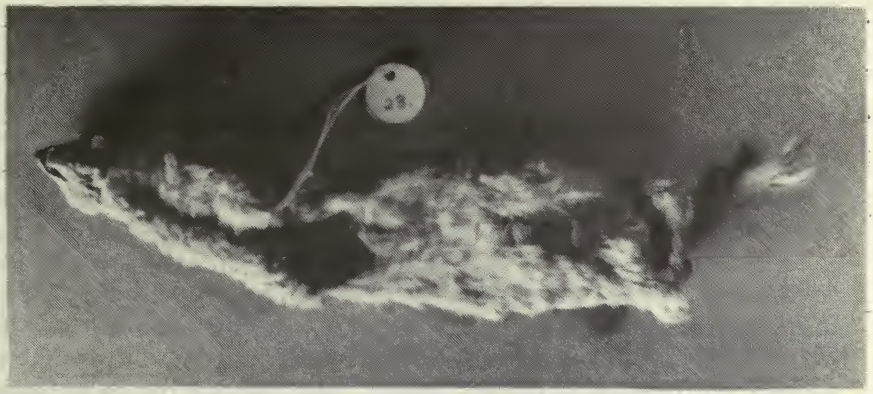


Figure 14. Weasel skin.

21. UNTIED BUNDLE. This (deer?) skin section is also gathered in the middle and also appears to contain herbs. No known use. (Figure 13, B)

22. SKIN BUNDLE. Like Nos. 20 and 21, this skin bundle contains unidentified herbs, in this case in a brown (ochre?) mixture. This bundle is tied with a thong of smoke tanned buckskin. Its manner of use is unknown. (Figure 13, C)

23. WEASEL SKIN. This complete pelt of the short-tailed

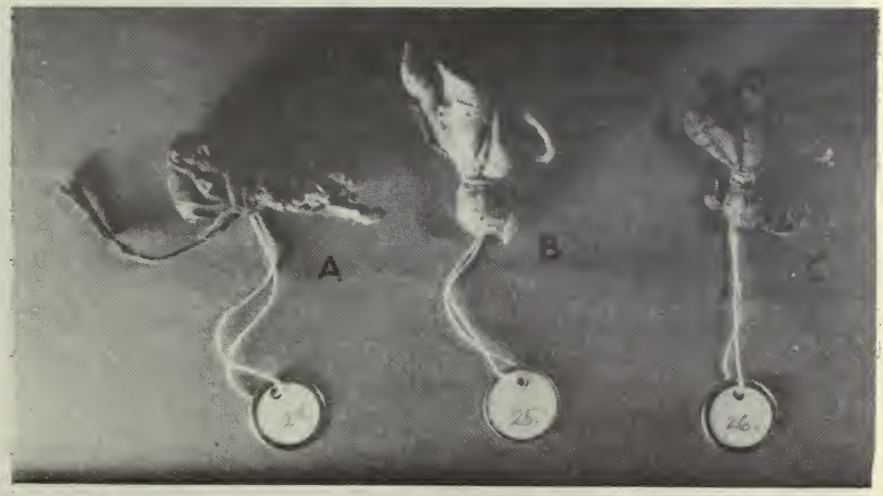


Figure 15. Fawn skin bundle (A); Small buckskin bundle (B); Small bucksin bundle (C).

weasel was prepared in a manner similar to that employed in the construction of otter and mink skin Medicine Lodge bags. The weasel was killed during the winter when it had its white ("ermine") coat. The skull was left in the skin although the posterior portion of the calvarium was removed in order to extract the brains and other soft tissues. Inside is a small rectangle of blue cloth. It is possible that the skin was originally prepared for use as a Medicine Lodge bag.

Mr. Buckman told me that it is practically impossible to shoot a weasel because they are so quick. With the proper magical formulae, the Bear-Walker would insert the weasel skin in his shirt and would take on the properties of the weasel: quickness and practical invulnerability to bullets. (Figure 14)

24. FAWN SKIN BUNDLE. This bundle contains a buff colored herb mixture and was tied with a strip of blue cloth. Its use is unknown. (Figure 15, A)

25. SMALL BUCKSKIN BUNDLE. This small smoke

Figure 16. Bear-Walker charm bundle, tied.

tanned buckskin bundle is tied with a buckskin thong and contains a light turquoise-colored powder, presumably for use as a pigment. (Figure 15, B)

26. SMALL BUCKSKIN BUNDLE. Very similar to No. 25, but tied with string and containing a bright red ochre powder, also presumed to have been used for pigment. (Figure 15, C)

27. BEAR-WALKER CHARM BUNDLE. This is a small rawhide (squirrel or rabbit) bundle of the gathered type and is tied with heavy black thread. It contains three black bear claws (without the bone cores) and one small grey chert corner-notched projectile point.

Mr. Buckman indicated that this little bundle was the most significant of all in that it was the representation or symbol ("badge of office") of the Bear-Walker. The bundle's power would be significantly diminished without this particular charm.

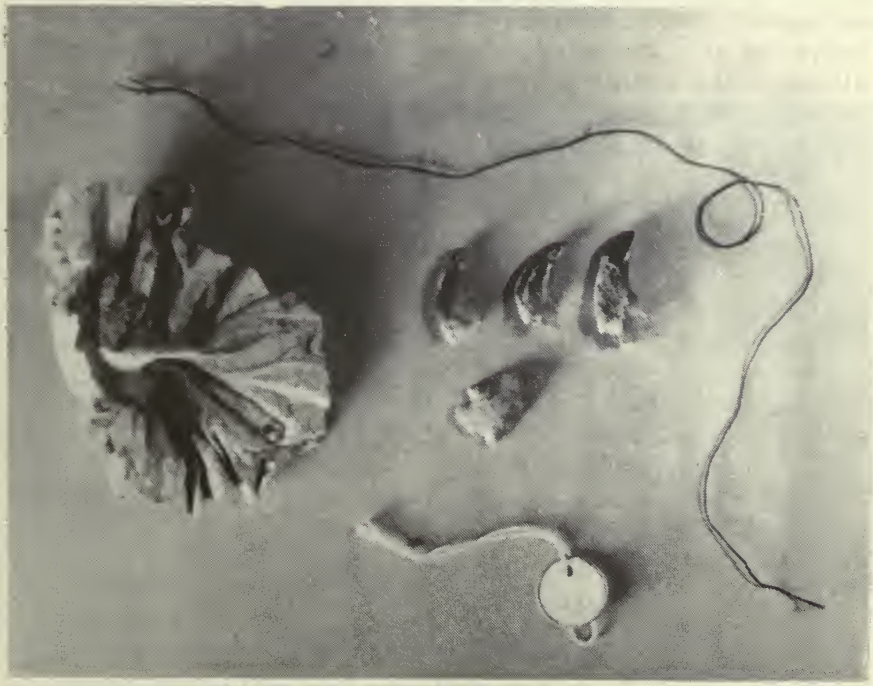


Figure 17. Bear-Walker charm bundle, unwrapped.

The projectile point is of some considerable interest. It conforms to the style of tool which was made and used by the prehistoric occupants of northern Wisconsin during the period from about A.D. 100-500. (Figures 16, 17).

It should be pointed out that several of the smaller bundles containing herbs and/or pigment fall into a rather standard category of personal charms. Such items are frequently found in medicine bags and other kinds of bundles. They are extremely personal in nature and had meaning only to their makers. Some of the bundles with pigment in them may have been "wish bundles." These usually contain, in addition to the pigment, a particular item which was desired in the hope that such treatment of the item would result in obtaining large quantities of the item. I have seen, for example, bundles containing red ochre and a coin, or red ochre and a bead - reflecting the desire for more money or for more beads.

The Drawings.

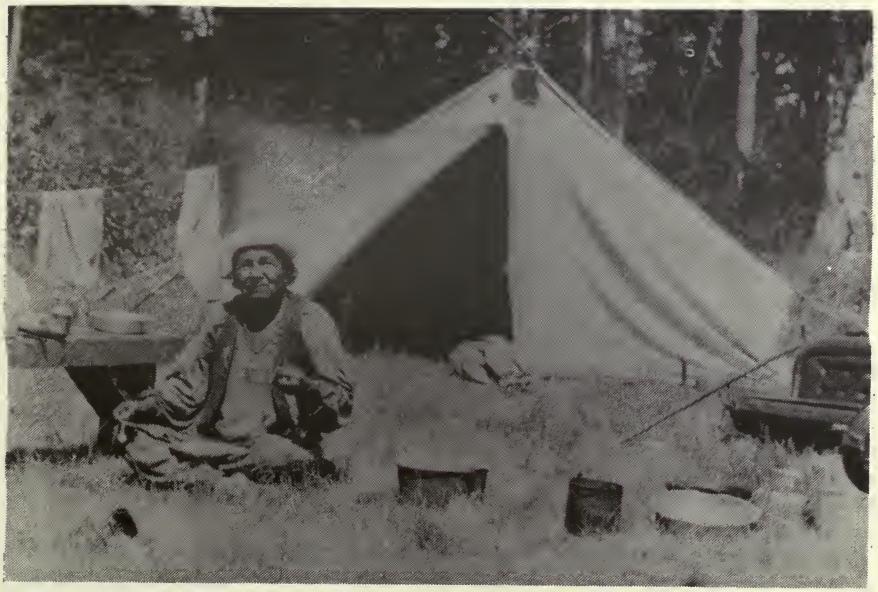
The following drawings were prepared by a recently deceased Potawatomi Medicine Lodge priest. They were prepared as a result of motivation supplied by Mr. Buckman, although the artist expressed an explicit desire to convey Potawatomi ideas and concepts to white people in general: "You take papers. White people looking."

The original drawings were executed in crayons and pencil, but have been traced from the original by the present author in order to improve the quality of their reproduction. Original qualities of composition were preserved when the tracings were made. To compensate in part for the prohibitive costs of color reproduction, descriptive statements on color are appended to each caption. The captions themselves were written in pencil by the artist's wife, since the artist was not literate in English. The drawings were done on simple white typing paper, and are part of a larger collection of drawings and comments relating to various aspects of Potawatomi religion, mythology, and magic. Several of these drawings will be dealt with in future articles.

Reference is made in several of the drawings to the "Tree Creature." I have been able to gather some information concerning this mythological animal.

The Tree Creature (Mi-Use Esh-Eh-Quot Ma-Toe Ta-Coke-Ade) is believed to be a very powerful and very evil spirit, and is thought to live in and around swampy lakes, especially those with murky water, or among hills. It is, of course, possession by the Tree Creature which results in an Indian becoming a Bear-Walker. However, the Tree Creature may also inhabit a tree, a house, or other objects. He may also take the form of a cat, a horse, a chipmunk, or, of course, an Indian. In three of these forms he can do damage and evil. In the form of a chipmunk, however, his ability to wreak havoc is limited and he takes this form in order to spy. Under this guise he can live in villages, even enter houses, without raising much suspicion. Under these conditions, he can learn how he might best tempt any particular Indian into becoming a Bear-Walker.

The primary counter-force in Potawatomi is the Thunders, or Black Thunders. The Thunders are engaged in a continuing war with the Tree Creature and have as weapons the use of lightning. Thus, when lightning strikes a house, a tree, a telephone pole, a horse, or even an Indian (as in the case of Num-Key-Wan-Ess, below), this is explained as a battle between the Tree Creature and the Thunders.



Num-Key-Wan-Ess, Thunder Woman, Potawatomi Bear-Walker.

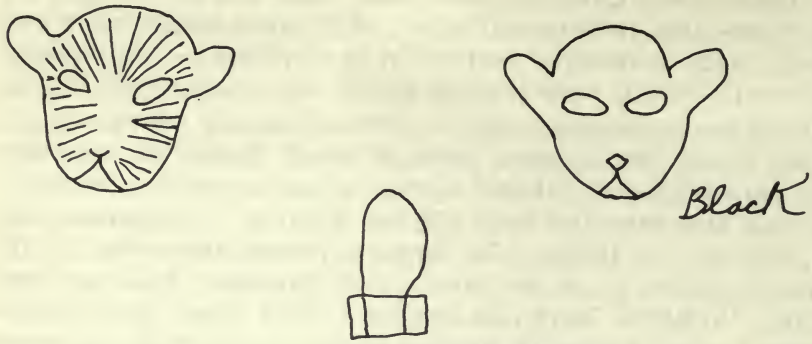


Figure 18. "This tree monster someime look brown and black. This is were the Black Magic comes from a case above."

(The tree creature is depicted in two forms: the representation in the upper left is outlined in brown, has black mouth lines and a black nose and has brown stripes on a plain background. The representation in the upper right is outlined in pencil and is colored black. The case at the bottom is brown and represents a Bear-Walker bundle. - ed.)

Figure 19. "The picture that are drew on the second page. This tree creature turns into an Indian to give the case of Black Magic to the Indian that has the gun. But it's bad to take it from him."

(The background is brown, as is the representation of the Bear-Walker bundle in the center foreground. The tree on the left and the "Indian" are also colored brown. The Indian on the right is outlined in pencil, has brown trousers and a brown gunstock. The gun barrel, the hair, and the tip of the feather in his hat are black.

The drawing depicts the Tree Creature in his guise as an Indian in the process of recruting a Bear-Walker from an Indian who appears to be engaged in hunting. The Tree Creature-Indian is depicted as being naked. -ed.)

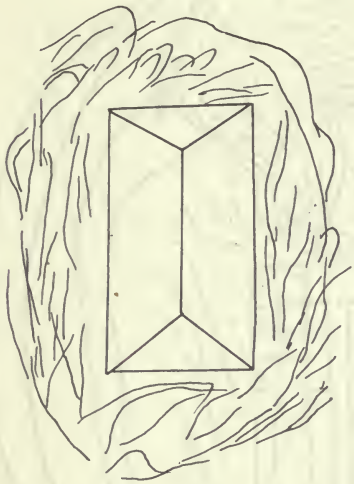


Figure 20. "The picture drew of the black bear and Coffin. This Indian that knows the black magic turns into a black bear and makes the dead person come back to alive and gets hold of its tongue and pulls it out."

(The "coffin," or more accurately, the wooden structure placed on top of graves - note the "spirit hole" at the top - is outlined in pencil with the aid of a straightedge. The "coffin" is surrounded by erratic brown crayon lines, possibly representing earth. The bear is outlined in pencil and is colored black, with the exception of the area around the nose and eyes, which is colored yellow. - ed.)

Figure 21. "The picture on 4. Is the black Magic bear. he goes round the Coffin four times to do this on page 2 (Fig. 20). before he makes the dead to talk and pull its tongue out, because he never forget what the dead person said to him. The black Magic poison him for a little word like he quarrel with him and the black Magic person never forgets him and kills him for it."

(The bear is outlined in pencil and colored black except for the face, which is yellow. The bear is standing on a brown field which surrounds the "coffin." Around this entire composition there are four brown circles representing the four circuits made by the bear around the coffin. The coffin itself is partly drawn with the aid of a straightedge, partially drawn free-hand, with a pencil. Inside the coffin is a representation of the dead person which is outlined in pencil and colored brown. -ed.)

Figure 22. "This is the way it looks when it's in the night when it's round with fire or light coming from it's mouth."

(The bear is outlined in black crayon and filled in with black crayon. The face area is outlined in pencil and colored orange. Yellow crayon lines emanate from the bear's mouth. -ed.)

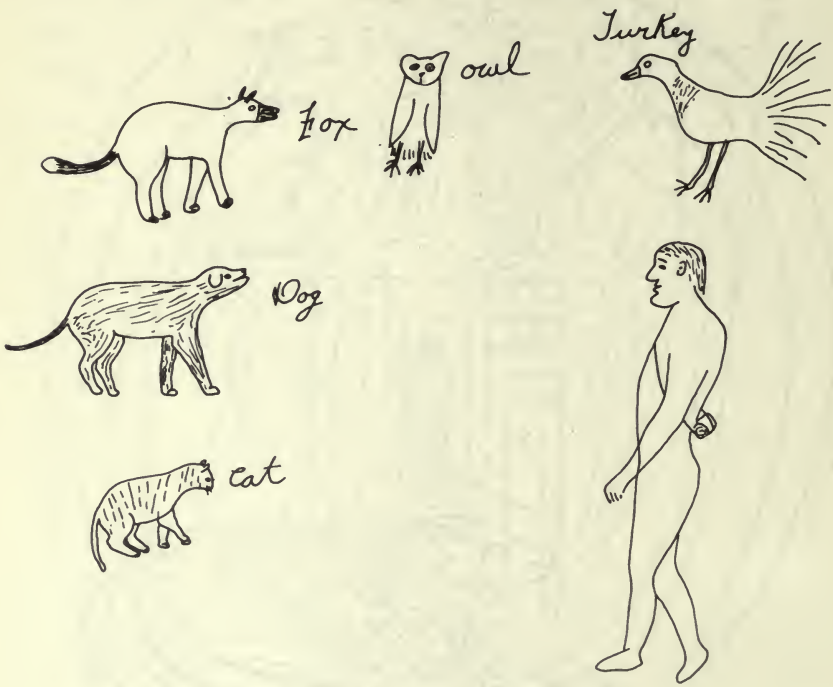


Figure 23. "Pictures that are drew, it turns into them to travel faster during the night and carries the Case with him, without clothing on him. This is a bad person to do such a thing."

(The "fox" has a brown body and black ears, nose and tail. The "owl" is colored brown. The "turkey" has a black head, a brown body, a green neck, brown tail feathers with green tips. The "dog" is colored black. The "cat" is outlined in pencil, has black feet and the body is striped with brown. The "Indian" is colored brown with black hair. He is depicted naked except for the Bear-Walker bundle. -ed.)

SUMMARY AND ADDITIONAL DATA

Bear-Walkers receive their "power" from the Tree Creature. Apparently, particular individuals are studied by this evil manifestation in the guise of a chipmunk in order to discover the individual's weaknesses. Based on this study, the Tree Creature tempts the individual and tries to persuade him to take possession of the Bear-Walker bundle and its power and to do the bidding of the Tree Creature.

The bundles are very bad and the person who accepts the bundle is also considered to be "bad." Both males and females may become Bear-Walkers by accepting the bundle. Apparently, the bundles are usually made of bear skin, although badger skin is clearly also used. When not in use, the bundles are usually buried off in the woods since the bundles are very powerful and can contaminate or infect innocent people who have contact with them. The charms in the bundle are used by the Bear-Walker for purposes of protection and for revenge (for insults or displays of disrespect) and can cause the victim to suffer illness and death. One informant indicated that the power of the charms always turns back on the user and his family, and cited an example of a man whose family had died off one by one after he had used the bundle. The user also died soon after. Mere possession of a bundle would have serious side-effects to the uninitiated and non-Bear-Walkers who desire to have a family should not have possession of such a bundle. I was told that this would hold true even for white men, although it was admitted that the effects would be diminished in this case.

When bundles are to be permanently disposed of they are buried in the woods away from habitation areas. One informant indicated that he supposed that there were many such bundles buried in the woods nearby.

Bear-Walkers, called mini-do'-sowit or mindo'sa, have the ability to resurrect the dead for purposes of revenge for a wrong committed against the Bear-Walker by the deceased. It is probably for this reason that Bear-Walkers are not maligned by the living.

Bear-Walkers are most active at night. I was told that bears with fire shooting from their mouths are sometimes seen in the woods at night. The "souls" of Bear-Walkers are in such animals, and in this condition they are very

vulnerable. If one such animal is hit with a stick, for example, the soul of the Bear-Walker is injured and it (the soul) will not be able to return to its owner. The Bear-Walker then dies in a trance. One informant told me that he had heard of an Indian who shot such a "bear" and, after he had approached the carcass, he discovered that it was the body of a dead Indian, shot in the same place.

Bear-Walkers are said to be able to change themselves into a variety of animal forms. In addition to the bear, the shapes of foxes, owls, turkeys, dogs and cats can be assumed for purposes of speed in travel if for no other reason.

I was informed of the story of a particularly well-known Bear-Walker who was known as Num-Key-Wan-Ess (Thunder Woman). This woman was born near Manitowoc, Wisconsin, and became quite famous as a medicine woman. She was eventually killed by lightning in either 1913 or 1922. One informant provided the following written account:

> "This happen to the story that you mention the Indian women who was strike during the year of August. 14. 1913. This women was a bad one, who knows Indian Black Magic, she done too much trouble of Killing Indians. She happen to be out side near her Indian hut, she was out the garden working, she seen the big Black Clowds of Thunders, she said some strange words to them and she ran to her hut and the Thunder ball start to follow her, into her hut and it strike her to pieces. You know she was just crash up. Just like flour."

I was curious to learn what had happened to Thunder Woman's Bear-Walker bundle. I was told that "some Indians" had found it after the episode related in the story and had examined it. Inside, they found the bones of a baby. The final disposition of the bundle was not known. Some years later, I had an opportunity to examine some of the medicine bags which had belonged to Thunder Woman and there was no bundle which could be construed as a Bear-Walker bundle among her effects.

Bear-Walkers are regarded as very evil. They are treated with respect and deference out of awe and fear. To openly confront a Bear-Walker is to endanger one's health

and the health and lives of one's family. Under such circumstances, it is not surprising that the Potawatomis do not openly discuss such shamans with strangers or with white people. It is difficult to know if Bear-Walkers are still found among the Potawatomis. My informants may have felt security in providing me with general information about the phenomenon and with information about past events, but it is possible that they may have withheld data on current practitioners for their own protection. I can only assume that Bear-Walkers are, or were in 1959, a real part of the Potawatomi environment because I was once mildly reprimanded for introducing a stranger to one of my informants on a day when the sky was filled with thunder clouds. In a very pragmatic manner I was told that I should have known better than to create a situation which might threaten the safety of the informant's house, since if the stranger was a Bear-Walker, and was inside the house, the house might be destroyed by lightning as a result of the "Thunders' " attempts to destroy the Tree Creature.

Other Data.

Comparative data on the Bear-Walking phenomenon are not immediately apparent in the literature. Richard Dorson (1952) collected folk tales from several ethnic groups in the Upper Peninsula of Michigan and his sample included relevant information from both Potawatomi and Chippewa informants. The particular Potawatomi community which he investigated is the Hannahville, Michigan settlement. This community is regarded by many of the Wisconsin Forest County Potawatomis as having lost most of the "old ways."

One of his Potawatomi informants indicated that he had knowledge of " . . .five or six bearwalks around here" (1952:29). This informant also said that such "bearwalks" are shot and killed at night, when they are identified by their light or glow. He went on to point out that the evil effects of bearwalks can be countered by the appropriate magical medicines. These data suggest that Bear-Walking was present in the Michigan area.

Dorson's informants add that Bear-Walkers can transform themselves into bears, that they are most active at night, and that they usually go about naked. Specific quotes from Dorson's informants are appropriate and add further details:

"On the fourth night after they kill the patient, they go to the grave, and you can hear the carcass raise right up out of the casket, and they cut off the fourth or fifth finger and the tongue tip, and put it with their victim set." (1952:29).

In another case, his particular informant admitted to having seen a Bear-Walker, and he describes the manner in which Bear-Walkers learn their skills:

"In the dream they claim the bear is bad stuff. He learns you how to kill somebody. This man in the dream has some part of him like a bear, a little claw, or a tooth, or an ear, or a little bear hair. And you say to it, 'I want to be a bear.' And he has the power, in his medicine bag, to make you a bear. Then if you got some enemy you want to kill you can do it, see. That's what they call bearwalking." (1952:34)

Apparently, Bear-Walking is also found among the Prairie Potawatomi in Kansas, where it seems to be organized into formal bundle societies. Ruth Landes studied this branch of the Potawatomi and notes:

"The most 'powerful,' hence 'evil,' shamans were said to transform themselves into non-human forms during their dastardly enterprises (as described below); the word 'mandohzid' covered this aspect of their functions as well as the concept of evil shamanism." (Landes 1970:44)

Landes quotes a remarkable statement concerning Bear-Walking activities from an admitted Bear-Walker:

"They know that if I reach the graves, I'll get the tongues. In fact, I have Shabni's already. They sure keep watch. Bogdo (Wayatn) was guarding Shabni, but I got it! . . . The corpse retains the living soul for four days after death. During that time, you can ask the (dead), 'Which will it be? Tongue or finger?' They always answer finger. You say, 'Not enough.' You always end up with the tongue. Just pretend to give them a choice, for the fun of it. . . .After (a shaman)

extracts the tongue, he'll have a feast of tongues with his partners. . . ." (1970:124)

Landes also has a story related by a Prairie Potawatomi concerning a Michigan Potawatomi who apparently had gained some considerable reputation as a killer of Bear-Walkers:

> "He watched for the 'fire' they use. He would take his gun, sit close by the track of this thing when it was running, and shoot it as it passed. After a day or so, he'd hear that an old man or woman was dying quick, and that the relatives were burying him quickly, so people wouldn't know he was shot. . . . The mandohzid puts on a bear-hide and looks like a bear running. He holds rotten wood in his mouth, which looks like fire, at night. . . . Some other people used to see a big black dog sneaking around the house when the mother fell sick; she stayed sick for a long time, and the dog sneaked back every now and then. Finally the son fixed up some abzeedjigun preventer, doctored his gun, ammunition, and himself with it, and took watch. As the dog was jumping over the fence, the man shot him - four or five days later, an old lady died. She'd told the young fellow she was raising (as a foster son) to hitch up the wagon for her. She was climbing up, when she fell off, and got hurt bad. They found a big hole in her butt at just where the dog was shot, and she died. . . . People see the mandohzid light in different ways: some see it moving along the road, others see it flying, some wear bear-hide, or hide of cat, dog, or of a weasel that looks brown in summer and white in winter." (1970:125)

Some years earlier, Alanson Skinner also collected information concerning this phenomenon among the Prairie Potawatomi:

> "Witches, or wizards for that matter, for both sexes practice malevolent magic, are supposed to keep rolls of birch bark in their bundles upon which they draw pictures of their victims. These they shoot with a miniature bow and arrow, the arrow first having been dipped

in medicine powder. . . . The victim is then sure to be afflicted in the part so enchanted. It is said that the witches often do this to people against whom they hold no grudge, simply to be able to be called in to doctor them, and thus obtain a large fee. Of course witches are, in general, especially lucky in healing, as no disease is natural, but all come from the machinations of sorcerers, according to native belief.'' (Skinner 1923:205)

Such witches are also capable of changing themselves into wolves or bears.

Skinner found a similar manifestation among the Menomini Indians in Wisconsin, where ''witches'' were apparently organized into two societies, represented by owl and bear medicines. Each society consisted of four individual members who cooperated with each other to accomplish the ends of any particular member. Apparently, death to nonmembers was one of the activities engaged in by the societies:

''When the sorcerer has killed his victim, his magic arrows still remain in the body and it is necessary for him to recover them. He waits until the fourth night after the funeral, when, at midnight, he goes to the sepulcher. Here, through virtue of the horned serpent, he changes himself into a bear and walks four times around the grave. At the fourth circuit, the coffin rises to the surface. The sorcerer orders the coffin to open, the lid comes off, and the corpse revives, shrieking for help. Its remorseless tormentor tears out its vitals, heart, and lungs with its claws. The coffin sinks back into the grave, and the ghoul, transforming himself into a firefly, returns to his lair, where he leaves his ghastly booty till the following day, when he returns. He makes a small fire over which the lungs and heart of his victim are partially roasted, and then devours them, singing songs in behalf of his monstrous patron.'' (1915:183)

Skinner adds:

''. . .some very powerful sorcerers make use of an entire bearskin which they put on before attacking their

victim. The owner of such a skin keeps medicine bundle furnished with all manner of evil medicines, particularly a bandolier or shoulder strap fastened to which are little bags or pouches, containing such venomous things as dried black spiders, black lizards, toads, snakes, flying squirrels, weasels, and sly, swift creeping animals. They may be worn alone by the owner over the naked body in his midnight raids. Such a wretch often keeps an image of his victim in a glass box, from which nothing can escape. Witches of this sort also travel in the shape of a ball of fire, as well as animals. They chew up some of their medicines and spray them from their mouths over their bodies, and then change shape." (1915:185)

There are scattered accounts of Bear-Walking, or at least very similar shamanistic phenomena, among the Chippewa Indians in Minnesota and Upper Michigan. Dorson collected information from a Chippewa Indian from L'Anse, Michigan:

> "The whole proceedings is called the bearwalk. A person who has that power to make people evil or sick can take all forms, especially an owl or a bear. The light appears at the same time. Then the one who sees it gets sleepy, gets sick and dies." (Dorson 1952:27)

In addition, his data indicates that a Bear-Walker can be identified because his eyes are bloodshot and crossed. Other data which Dorson collected corroborates the practice of going to the grave of a person who has been magically killed to recover the medicines used, the appearance of a fire-breathing bear, Bear-Walker bundles, the wearing of bearskins, human-bear transformations, corpse mutilation, and the presence of both men and women in this shamanistic role. No mention is made of formal societies of such witches.

Hoffman mentions a similar phenomenon among the Minnesota Chippewa before the turn of the century. He received information on a series of birch-bark scrolls which depicted the organization of the Grand Medicine Lodge.

Describing one of the scrolls:

> "No. 50 represents a Mi'tsha Mide' or Bad Mide', one who employs his powers for evil purposes. He has the power of assuming the form of any animal, in which guise he may destroy the life of his victim, immediately after which resumes his human form and appears innocent of any crime. His services are sought by people who wish to encompass the destruction of enemies or rivals, at however remote a locality the intended victim may be at the time. An illustration representing the modus operandi of his performance is reproduced and explained in Fig. 24, page 238.
>
> Persons possessed of this power are sometimes termed witches, special reference to whom is made elsewhere. The illustration, No. 50, represents such an individual in his disguise of a bear, the characters at Nos. 51 and 52 denoting footprints of a bear made by him, impressions of which are sometimes found in the vicinity of lodges occupied by his intended victims. The trees shown upon either side of No. 50 signify a forest, the location usually sought by bad Mide' and witches." (Hoffman 1891:168-9)

The Sauk and Fox tribes were at one time residents of the State of Wisconsin. In 1914, M.R. Harrington published the following account of witchcraft among the "Sac and Fox":

> "The belief in witchcraft, is practically universal among the Sac and Fox, being shared by the educated and progressive element, as well as the conservative portion of the tribe. One of my interpreters, an educated man, often tells in perfect good faith how, traveling along a lonely road one night he encountered what appeared to be a stray dog, but which suddenly changed before his eyes to a tall Indian, naked but for a breech clout, across whose shoulder was dimly seen the strap and pouch used by the 'night travelers,' or witches, who, it is believed, customarily go about in this guise. To the Indian, a 'witch' may be either a man or a woman, a member of the society of sorcerers.
>
> Few will acknowledge membership in such a society,

and fewer still will give up any of its paraphernalia to a collector. One small bundle of witch medicine was secured, however, with its little carrying pouch and shoulder strap (Pl. XXXVII, A), from an Indian who asked me as a special favor not to use his name in connection with it. It had formerly belonged, he said, to old Ma'wa ci, now dead.

If a 'witch' has an enemy he wishes to get out of the way, he tells the other members of the society how this man has treated him. After holding a meeting, if they all agree that he shall be killed, the first step is to draw a picture of a man on the ground, which represents the intended victim. A little stick or similar instrument is thrust into the figure in whatever part of the body they wish affected in the victim, and little of the mixture from the bundle is sprinkled on the place; this is supposed to cause pain in the corresponding part of his body. Then they set the time when the victim is to die.

It is believed, that witches can assume the forms of four different animals - the bear, dog, owl, and mole in succession. Some claim that the raccoon should be placed in this list instead of the mole, and opinions seem to differ as to the exact list. When in the form of a mole, they can approach their enemy unseen, underground, the Indians say.'' (Harrington 1914:248-9)

Discussion.

Primary data concerning the Bear-Walking shamanistic phenomenon among the Potawatomi Indians in Wisconsin has been presented in a variety of forms. Additional data from the literature for neighboring Algonkian-speaking groups in the Wisconsin area has been supplied to document the existence of similar and related shamanistic developments among other Indian tribes.

Bear-Walking is universally considered bad and evil among the Potawatomi. Bear-Walkers receive their power from spiritual sources and use this power to cast spells for revenge or profit and to effect cures of such spells, indicating that the magical power of the Bear-Walker can be

counteracted. There is danger in using or possessing the physical manifestation of the Bear-Walker's power - the bundle itself - since there is a ricochet-effect and the power may infect or rebound on the user. Probably related to this is the general conviction that Bear-Walkers do not have much success in raising children.

The seat or focus of the magical power is located in the bundle itself. The power persists after the death of the owner of a bundle. The presence of the bundle is required during the practice of "black magic" and is worn over the shoulder of the otherwise naked Bear-Walker when he is engaged in his activities. The bundle is usually buried when not in use or after the Bear-Walker dies, presumably to insulate the innocent from its infectious qualities.

Bear-Walkers possess the ability to magically transform themselves into a variety of animal forms, including the bear, owl, fox, cat, dog, and turkey, although the form most commonly employed is that of an unusual bear which emits a glow or "fire" from its mouth. Since Bear-Walkers travel in this form at night, it is possible to identify such a magical animal. In the state of transformation, the Bear-Walker is particularly sensitive and vulnerable to physical attack and can be mortally injured, and, at the time of death, he reassumes his human form.

One of the activities of the Bear-Walker, and certainly one of the most feared, is grave visitation. The soul of the dead remains in the body for four days after death and is vulnerable to resurrection and mutilation by a Bear-Walker during this period. There are hints that such mutilation as removing the tongues and/or fingers is associated with at least ritual cannibalism.

Both males and females may become Bear-Walkers and these individuals may organize themselves into societies. Bear-Walkers keep their identity secret, although most people in a community have strong suspicions as to who in their midst has been called to this "profession." What data there is indicate that Bear-Walkers live in domiciles which are physically separated from the rest of the community, although it is not clear if this procedure is adopted by choice. Known Bear-Walkers are treated with respect and awe. The source of this deference is certainly rooted in fear of offending and therefore incurring the wrath of such individuals. Such fear generalizes to all strangers

since the possibility that strangers may be Bear-Walkers is assumed.

Belief in Bear-Walking is widespread and is not restricted to "conservative" or traditional oriented individuals or groups. Belief in this phenomenon occurs among relatively acculturated individuals and among communities which have lost most of their aboriginal customs. Fear of such witchcraft can be seen to play a significant part in the environment of the contemporary Potawatomi, as it is among the neighboring Chippewa and Menomini (Spindler & Spindler 1971:71-8).

Unquestionably, fear of witchcraft and, specifically, Bear-Walking, is a primary factor in social control among such groups as the Potawatomi who have lost many of the aboriginal structures which were designed to do this. The pattern which the Spindlers observed among the Menomini, involving lack of assertiveness and avoidance of open confrontation for fear of magical reprisals (1971:78) should be applied to the Potawatomi and perhaps to other contemporary Indian groups in the state.

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BOOK REVIEW

Eighteenth-Century Ceramics From Fort Michilimackinac: A Study in Historical Archaeology by J. Jefferson Miller II and Lyle M. Stone. Smithsonian Studies in History and Technology, No. 4, Smithsonian Institution Press, City of Washington, 1970. 130 pages, 51 illustrations, Bibliography, 4 Appendixes, Index. $3.25 (cloth).

Fort Michilimackinac was strategically located on the Straits of Mackinac, between Lake Huron and Lake Michigan. The fort was established about 1715; in 1781 it was relocated on Mackinac Island to the northeast. The report here discussed deals with the ceramics recovered from excavations carried out at the site of the original fort between 1959 and 1965 by the Museum and Anthropology Department at Michigan State University. This analysis of the recovered ceramics, however, includes the cooperation of the Smithsonian Institution in the presence of co-author Miller, who is associate curator of the Division of Ceramics and Glass at that institution.

The introduction poses the interesting problem of reconciling the needs and interests of the ceramics historian with those of the archaeologist. The analysis which follows in Chapter II is a kind of compromise, satisfactory (apparently) to each. The authors distinguish three levels in their classification system: Class, based on paste and firing differences; Groups, based on physical and stylistic differences, and Types, based on differences in style or technique of decoration.

The first chapter presents a well documented history of the fort, followed by a brief discussion of the archaeological work and reconstruction program. The main body of the report, however, lies in Chapter II, which describes the ceramics within the classification scheme presented in the introduction. This section is very detailed and well illustrated with photographs of sherds of the types discussed. The comments accompanying the ceramic descriptions are often very useful and interesting in their own right. This section should prove useful to anyone anticipating excavation in 18th century sites, whether forts or other kinds of sites, for the pottery is far more varied than one would expect

from a fort on the frontier.

The third chapter is made up of an interesting general discussion of the ceramics and interpretations thereof. Of particular value to the neophyte in the "uncharted waters" of historical archaeology, however, is the annotated bibliography, which provides a very useful commentary on a wide selection of sources, ranging from journal articles to books and professional reports.

Donald E. Thompson
University of Wisconsin-Madison

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WISCONSIN
ARCHEOLOGICAL SOCIETY

Vol 53, No 4
(New Series)

DECEMBER, 1972

THE WISCONSIN ARCHEOLOGIST

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SITE IN GREEN LAKE COUNTY
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THE WISCONSIN ARCHEOLOGIST

New Series

MILWAUKEE, WISCONSIN - DECEMBER, 1972

Published Quarterly by The Wisconsin Archeological Society

THE WALKER-HOOPER SITE
A GRAND RIVER PHASE ONEOTA SITE
IN GREEN LAKE COUNTY

Guy Gibbon University of Wisconsin-Milwaukee

INTRODUCTION

The Grand River phase project concentrated on the excavation of the large stockaded Walker-Hooper type-site of the phase. Because the site is multicomponent, the single component Bornick site in Marquette County was excavated as a 'control site' (Gibbon 1971). The primary goals of the project were to 1) establish the period of occupation of the two Grand River components, 2) ascertain their settlement-subsistence patterns, 3) reconstruct their relationships to other Mississippian and Late Woodland peoples in eastern Wisconsin, and 4) evaluate the influence the composition of the environment and its change had in the appearance of increased cultural variation and new cultural-ecological adaptations in eastern Wisconsin during the period of Mississippian development. Only conclusions and data regarding the first two goals are presented in this report; hypotheses relating to the latter goals have been presented in a separate paper (Gibbon 1972).

The term 'phase' has been adopted in this report in place of 'focus' as logically consistent with the classificatory scheme suggested by Robert Hall (1962). A tentative classificatory hierarchy for the Grand River phase is presented below:

Locus	Taxon	Unit
Area		Prairies (Driver 1961: Map 2)
-----	Tradition	Oneota
Sub-area	-----	Wisconsin or Wild Rice (Kroeber 1963: Map 6)
Region		'Eastern Ridges and Lowlands' and the eastern portion of the 'Central Plain' (Martin 1965: Figure 10)
-----	(ecotype)	'Lake-Woods' (Gibbon n.d.)
Locality		Upper Fox River (Martin 1965:281-282)
	phase	Grand River
	component	Walker-Hooper

Tables 53-60 comprising forty-six pages can be obtained from the Department of Anthropology at the University of Illinois in Urbana or from University Microfilms. They were not included in this report because of their length.

GEOGRAPHICAL SETTING

The heartland of the Grand River Phase of the Oneota Tradition is located within the Upper Fox River Drainage System in the southeastern portion of the central Wisconsin Plain in Green Lake and Marquette Counties. This area lies in a minor tension zone between deciduous forests, sedge meadows, and prairie types of vegetation. Warm, humid summers and cold, snowy winters characterize the climate. The present average annual precipitation is 31 inches with sixty percent falling as rain during a 140-150 day summer growing season. The soil parent material consists predominantly of Potsdam sandstone of the Dresbach formation (Upper Cambrian System) and, as a result, much of the soil is sandy. Unlike the forested counties to the north, short term climatic fluctuations and sandy soils with low water holding capacity have effectively maintained a continual flux between prairie and forest communities, preventing much of the native vegetation from reaching a forest climax (Curtis 1959). The boundaries of the biomes probably encroached upon each other during climatic episodes favorable to their spread. An expansion of grasslands northward during drier periods and a southward expansion of hardwood forests during cooler periods are examples.

The dominant topographic feature of eastern and central Wisconsin is the plain. There are two main kinds of plain, swamps in the lowlands, and prairies, many of which are on the drier uplands. The headwaters of the Fox River Drainage System lie in the Central Plain. In the Upper Fox River Valley, encompassed by Marquette and Green Lake Counties, the Fox flows through Lakes Buffalo, Green, and Puckaway, all of which are bordered by extensive marshes in well developed floodplains. Some measure of the extensiveness of marshland is reflected in the percentage of peaty soils, which occur predominantly in the lowlands adjacent to the Fox River and its tributaries. Peat is 17.3 percent of all soil in Green Lake County and more than 20 percent of the land area in Marquette County (Whitson et al. 1929; Peck and

Lee 1961). Horicon Marsh, a large silted lake covering fifty-one square miles, is situated approximately fifteen miles southeast of Green Lake County. In addition to marshland, lakes and streams also cover an extensive area. For example, there are 5641 acres of lakes and streams in a 296,885 acre land area in Marquette County. The low marshland plains and waterways in these two counties range in elevation from 760 to 800 feet above sea level. In contrast, the high prairie plain in southeastern Green Lake County has an average elevation of c. 1000 feet.

Although prairies did not cover a very large proportion of this area of Wisconsin, they were a prominent feature eliciting much comment from early European travelers. The country around Portage was described in 1819 as "prairie interspersed with large clumps of oaks, looking like islands, studding an immense sea of verdure" (Anon. 1819). One of the three largest prairies in eastern Wisconsin extends southwest from Ripon through the southeastern portion of Green Lake County. Savanna was one of the more widespread plant communities in presettlement times. Scrub oak and jack pine were the dominant trees on sandy soils, black and hybrid oaks on loamy soils, and white oak and hickory on clays and calcareous silts.

The three major types of vegetation were so interspersed that a traveler through the area noted, "the oak openings, prairies, and marshes are so situated and of such extent that most farms of 160 acres embrace a part of each" (Bayley 1954). The presence of dwarf cacti, such as the prickly pear (OPUNTIA COMPRESSA), and evergreen trees reflect the transitional character of this area.

Although the environment has changed considerably under the influence of white settlement, the late prehistoric faunal complex probably represented a mixture of Oak-Hickory forest and prairie animal species. Cleland includes this area in a Carolinian Biotic Province bordered on the south by an Illinoian Biotic Province typified by prairie fauna and flora (1966: Fig. 1). A broad transitional Carolinian-Canadian Biotic Province separates the Carolinian Province in the north from a hardwood forest Canadian Biotic Province. Jackson, in a somewhat different scheme, includes this region in a transition zone between species of the Canadian Biotic Zone to the north (of which Cleland's Carolinian-Canadian Province is a part) and the Upper Austral Biotic Zone, the

prairie zone, to the south (Jackson 1961).

It is within this setting that the components of the Grand River Phase are primarily situated. The Walker-Hooper site is located in a low, nearly level region of sandy soils bordering the flat Grand River Marsh, which is drained by the Fox River and its tributaries, such as the Grand River. The eastern border of this area consists of the high prairie discussed above. The western portion of Marquette County coincides approximately with the westerly advance of Cary ice. Consequently, irregular morainic ridges and hills and high pitted outwash terraces dominate this boundary.

SITE DESCRIPTION

As described by Jeske (1927) and McKern (1945), the Walker-Hooper site is a composite of several sites along a two mile stretch of the Grand River in Green Lake County (Map 1). A large village site and associated mound group (A in Map 1) are situated in the S.E. 1/4 of Section 11, Kingston Township, approximately one mile from the Grand Marsh. This site was the focus of excavations by Miller (1922), Jeske (1927), and Pasco (1932). A second apparently smaller village site (B in Map 1) is situated in the E. 1/2 of the N.E. 1/4 of Section 10 and the W. 1/2 of the N.W. 1/4 of Section 11, along the perimeter of the Grand Marsh. Shifting sand has disturbed half of this site, while burying the other half under dunes four to five feet in height. Cultural material similar to that reported from the two village areas has also been found along the floodplain between the villages and in the S. 1/2 of Section 3.

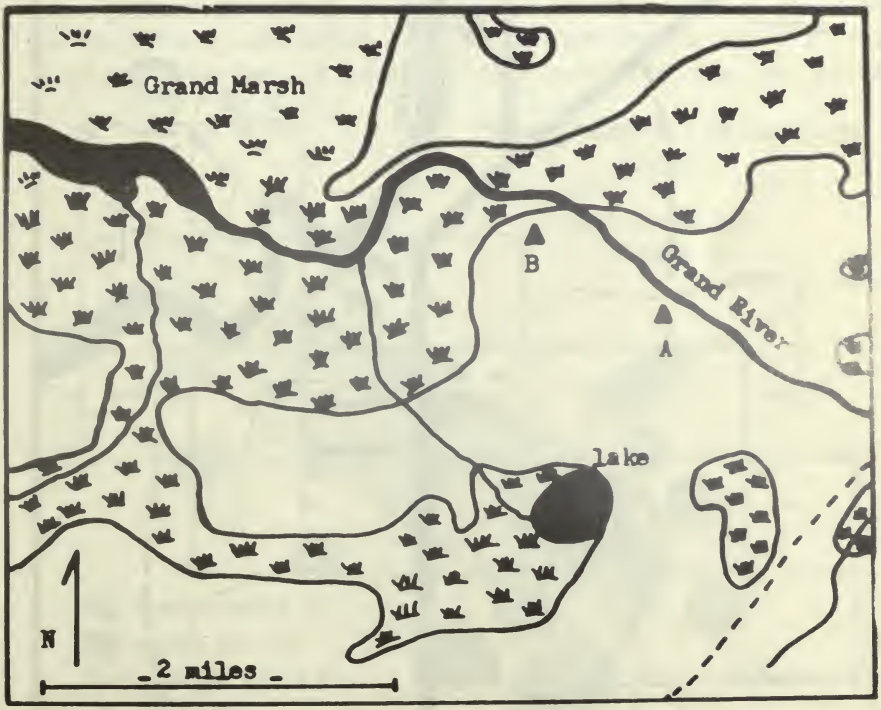
Field notes written by John Mullett in 1832 and 1834 describe the extensive marshes bordering the sites as "level wet, and treeless," while the dry, low lying areas of the township, including the site locations, are described as "thinly timbered with Black, White, and Bur Oak" (Mullett 1832, 1834).

The topographic setting of the main site (A), the site selected for excavation, is a fairly level area in a region of gently rolling hills (Map 2). Fields, roads, and structures now cover the site. Most of the soil in high areas is a Gray-Brown Podzol, MIAMI SANDY LOAM, a slightly acid soil characterized by a shallow grayish-brown sandy loam surface layer underlain by yellowish brown sandy loam and

reddish clay loam horizons. The soil in the low areas of the site bordering the river is yellowish PLAINFIELD FINE SAND. During dry seasons, crops on both of these soils suffer from a lack of moisture.

A spring near the bank of the river (Map 2) attracted settlers to the area at an early date. This same spring was probably responsible in part for the repeated aboriginal occupations of the site area reflected in the recovered artifacts.

In 1921 seventeen burial mounds and several refuse heaps were observed as surface features by Jeske (1927). The approximate area of the most dense mound concentration is indicated in Map 2. Many of the mounds were already reduced by cultivation in 1921 and none are now visible. Survey of the plowed fields in June, 1967, indicated a scattering of debris over a sixty acre area; undoubtedly some of this debris has been spread by plow through the years.

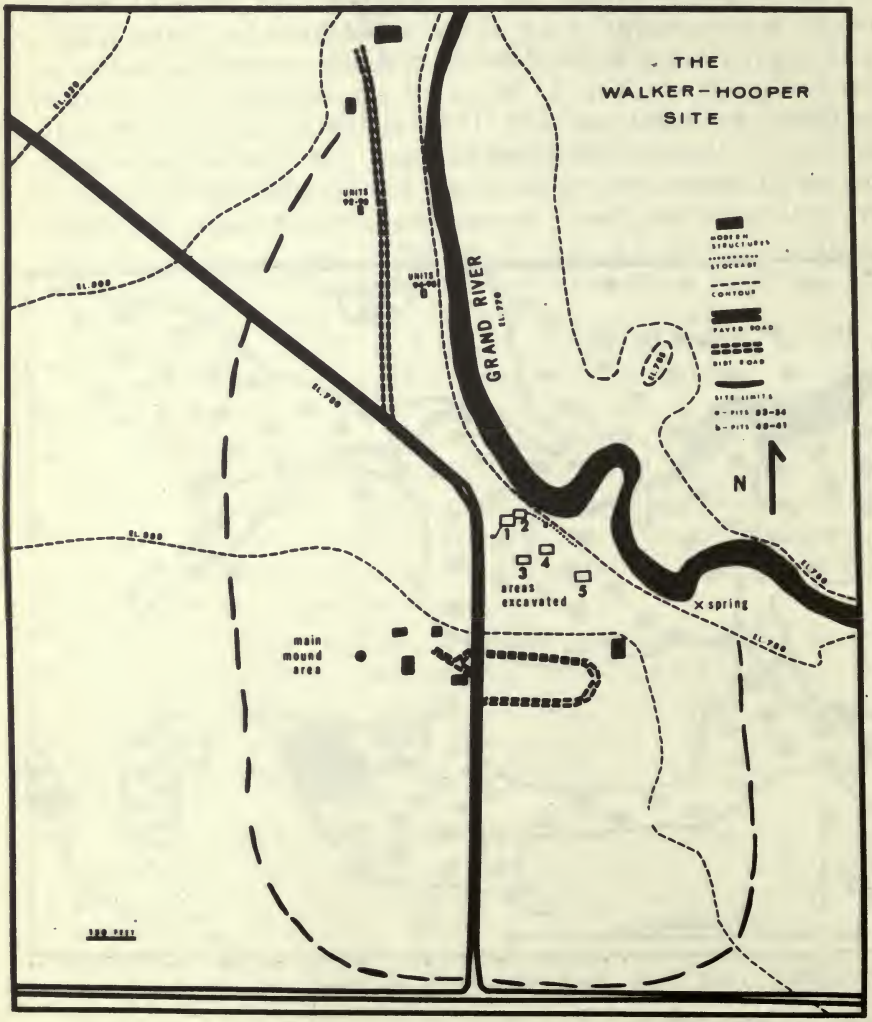


---military road from Fort Winnebago via Buttes des Mort to Green Bay

Map 1. Location of the Walker-Hooper site in relation to marshland in Kingston Township, Greenlake County (after Mullett, 1832, 1834)

PREVIOUS FIELDWORK

The most extensive previous archaeological excavations of the composite Walker-Hooper site were conducted during a six week period in the summer of 1921 by a Milwaukee Public Museum party. This party was supervised by L.J. Dartt and John A. Jeske, and was under the overall direction of S.A. Barrett. The foci of their excavations were the burial mounds scattered across the main site, but refuse pits and refuse mounds were sampled. A report describing



Map. 2. The Walker-Hooper Site - A (47GL65)

the mounds and their contents was published by Jeske in 1927. Limited excavations that have been reported were conducted by Towne L. Miller in 1921 (1922) and by George L. Pasco in 1931 (1932). Miller excavated portions of eight burial mounds, while Pasco concentrated upon refuse pits and burials not associated with mounds.

EXCAVATION PROCEDURES

An area of the main site bordering the river was excavated by the writer and a large number of volunteers during the summer and fall of 1967. This area had been covered by a road bordered by a secondary growth of oak and hickory until 1966 and was the only area of the site not under crop or a structure at the time of excavation. The basic unit of excavation was a square five feet on a side having levels five tenths of a foot thick beginning below a seven inch plow zone. All levels referred to in the report conform to these measurements. Trowels were employed in all but unprodutive levels and all dirt removed was screened

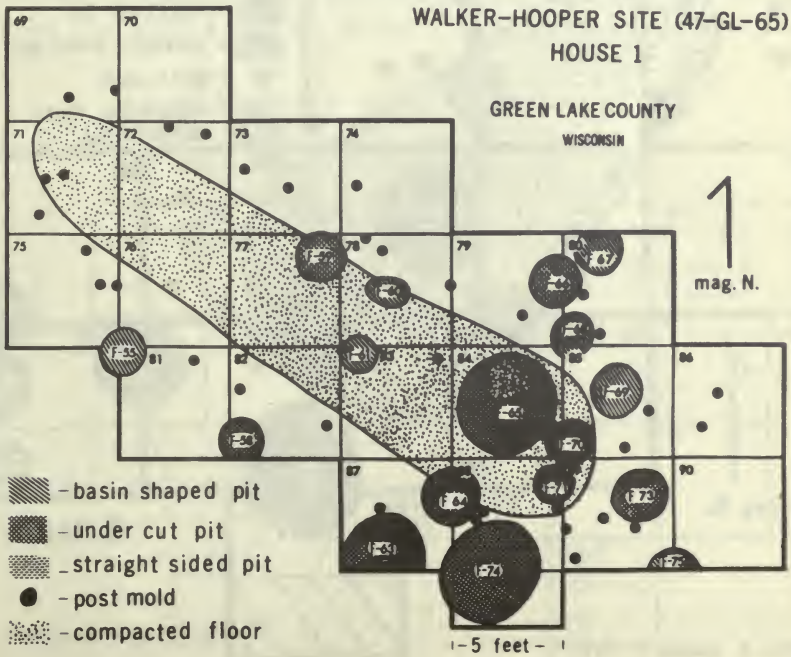


Figure 1. House 1

through quarter-inch mesh. Large samples of dirt from areas of artifact, bone, and charcoal concentration were taken back to the laboratory for water flotation. Most of the debris left in the screens after the sand was sifted was summarily bagged without separating the artifacts from other debris; this procedure hastened the tempo of excavation and ensured the recovery of material by a volunteer crew; 2325 square feet of the site were excavated during this period.

HABITATION FEATURES

Habitation features consisted of two palisades, at least two houses, extensive sheet middens, and sixty-six cache and refuse pits.

1. HOUSES. Remants of two houses were completely

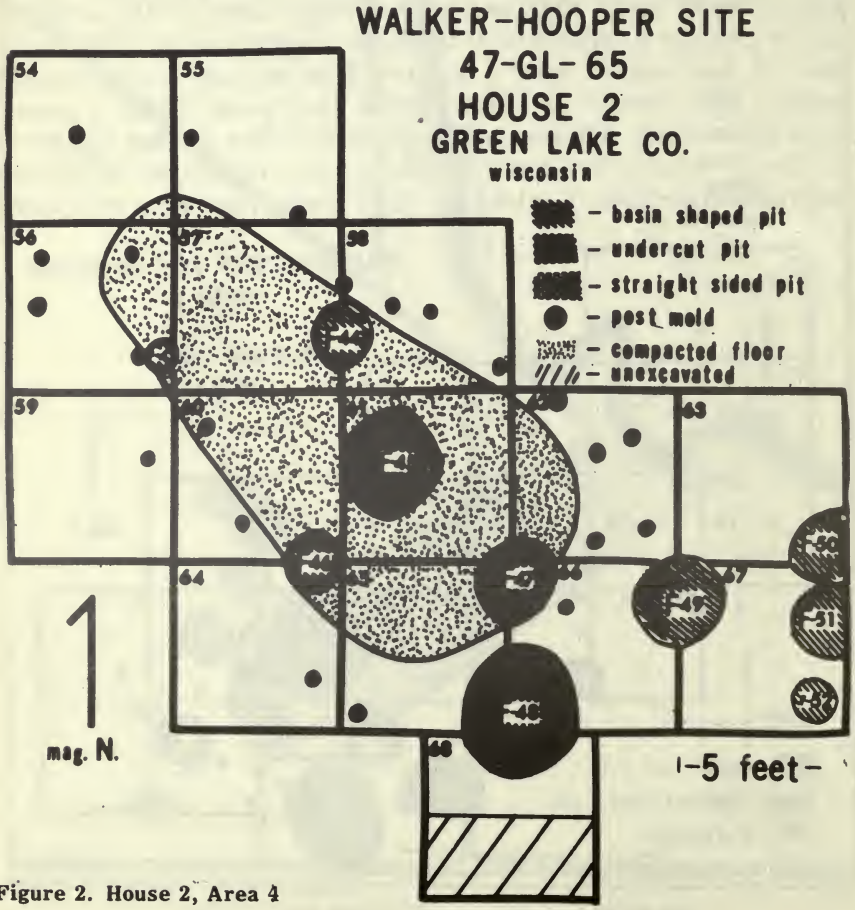


Figure 2. House 2, Area 4

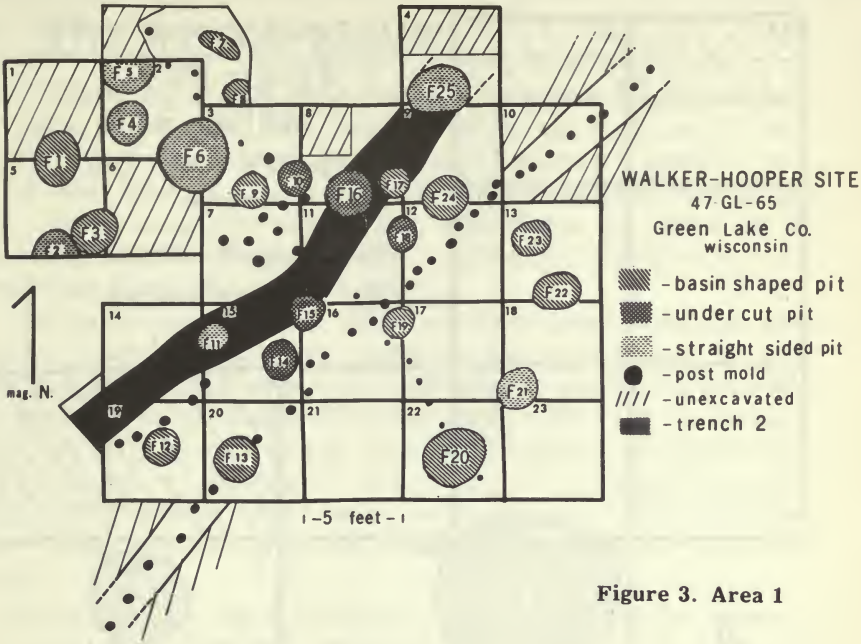


Figure 3. Area 1

excavated. Both were of a single type, a long oval expanding slightly towards the southeast along a northwest-southeast axis (Figures 1 and 2). House 1 measured thirty-one feet by

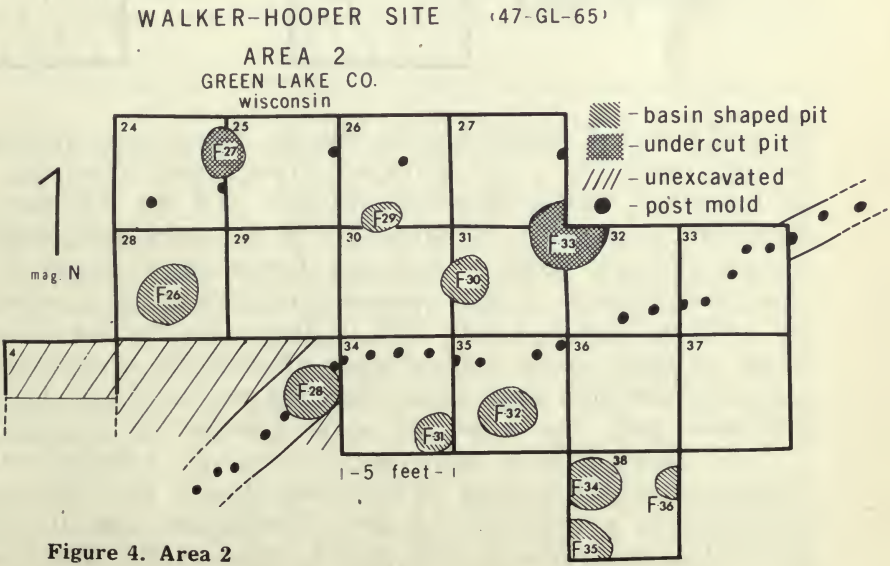


Figure 4. Area 2

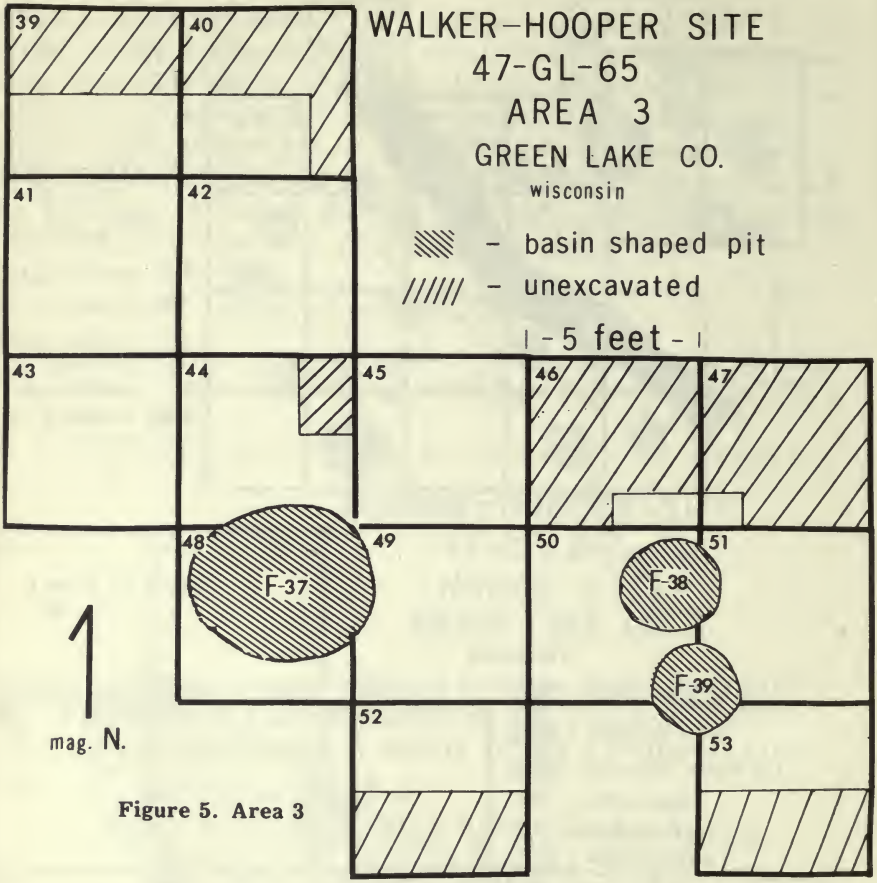


Figure 5. Area 3

ten and House 2 twenty feet by eleven. The houses appeared during excavation as tramped floors encircled by not particularly well-defined postmolds 0.5 to 0.6 feet in diameter separated by intervals of 1.5 to 2 feet; central supports were absent. A large firepit was found in the expanded section of each house overlying a large undercut pit (F65 in House 1 and F45 in House 2). Refuse pits and sheet midden were concentrated around the mouth of the expanded section, suggesting that this end had served as the entrance and the area of most intense daily activity.

The house floors were encountered as a dark brown, compacted clayish sand immediately below the plow zone, extending to a depth of 0.3 feet. Postmolds and pits were generally obscured by the brown color of the B horizon,

which faded to a dull light yellow C horizon approximately 1.1 feet below the plow zone. Postmolds became visible at this depth and extended straight downward another 0.5 to 0.8 feet. The gap observable between floors and postmolds may have resulted from the truncation by plow of an originally basin-shaped floor, probably produced by trampling along the central aisle.

The patterning of pits suggests that large undercut and straight-sided cache pits were concentrated in and immediately outside the expanded entrances, while smaller pits (usually basin-shaped) were placed to the rear or further from the entrances. There was no evidence of significant superposition or extensive rebuilding, or of a particularly lengthy occupation, that would suggest any interpretation other than a short and un-complex history for the two houses.

These houses were probably a variety of the domed bark- and mat-covered "wigwam" typical of the western Great Lakes area at the time of white contact (Driver 1961: 113, Map 15). Vertical poles were bent over and lashed together to form a series of arches, which were then covered with mats, bark, or hides. Two pieces of charred reed 1.5 feet in length were found in the floor of House 1 (unit 83) and may have been fragments of a mat used to line the walls or floor.

What might be a section of a third house was encountered in units 3, 7, 14, 15, and 19 of Area 1 (Figure 3). Although the size and configuration of the postmolds are identical to those of Houses 1 and 2, the lack of more extensive excavation and the jumble of postmolds precludes an accurate assessment of the kind of structure represented.

2. PALISADES. Two palisade lines of individually set posts one to two feet apart were uncovered during the last two weekends of the fall session. Like the house structures, postmolds were not visible until the C horizon was reached, approximately 1.1 feet below the plow zone. The more substantial of the two palisades was traced for 175 feet (A in Map 2). All of the postmolds were 0.5 to 0.6 feet in diameter and extended 0.5 to 0.9 feet downward after discovery. Many were filled with a light gray clayish soil, which resembled the gray clayish sheet midden that covered scattered areas of the site. An abrupt termination of the line was encountered along the eastern extension.

One explanation of this sudden termination is suggested by a line of postmolds extending through units 24-27 in Area 2 (Figure 4), which could represent an overlapping gateway facing the river. This interpretation is supported by the discovery of what might be a path hugging the outer wall of the palisade in Area 1 (Trench 2 in Figure 3). The "path" heads directly into the possible overlapping gateway, fading out in units 4 and 28. Trench 2, as the path was originally designated, was visible immediately below the plow zone and extended downward 0.2 feet. It was composed of a fairly compact reddish sandy clay loam containing very few artifacts. Reddish sandy clay loam is a characteristic component of MIAMI SANDY LOAM, the soil type fringing the southern-most units of Areas 1 and 3 and of House 2. The prolonged tramping of feet through the reddish sandy clay loam might be expected to transport some of this soil down along the path. The fact that Trench 2 fades out by units 4 and 28 lends some support to this interpretation. These interpretations of the possible structure of Palisade A are intended to be suggestive and should not be given more credence than the data warrant.

Palisade B may actually represent a portion of some other type of structure. It is a 30 foot straight line of postmolds 0.3 feet in diameter spaced one to two feet apart (B in Map 2). The line crosscuts Palisade A and may have been constructed earlier, for one of its postmolds was found beneath Trench 2 in unit 11.

3. SHEET MIDDEN. Light gray clayish soil rich in refuse materials hint at once extensive sheet middens in areas of daily activity. These middens have been truncated by the plow, leaving only irregular low dips still intact. Units around the entrance of both houses and units 28-32 in Area 1 (the "gateway") were zones of midden concentration, but zones also occurred over and around most pits. The distribution of gray sheet midden seems to correlate with debris concentration, indicating that it may be in part a product of the decay of organic materials. Large numbers of aquatic snails also correlate with these zones strongly suggesting that clay was being brought up from a marl deposit in the river bank and deposited over areas of the site. Similar concentrations of aquatic snails were found at the related Bornick site (Gibbon 1971).

4. PITS. A total of sixty-six storage and refuse pits

were located. Nine unreported pits resulting from tree trunk decay and historic farming activities were also given feature numbers. Like the postmolds pits did not become visible until the C horizon. Pits inside houses were generally smaller than those outside. All pits were vertically cross-sectioned and classified on the basis of the configuration of their profiles, which were either undercut (17), straight-sided (10), or basin-shaped (39). Examples of these profiles are illustrated in Figure 6 and dimensions of individual pits are listed in Table 1.

Undercut pits seem to have had necks flaring outward from the zone of maximum constriction. The area of maximum expansion varied, but it was generally at or near the base. Sides and bases were smooth and curved and in general slightly asymmetrical. Straight-sided pits were symmetrical with flat bases and slightly rounded junctures. A characteristic trait of both undercut and straight-sided pits was a "cap" of light gray clayish soil. Irregular zones of similar soil associated with concentrations of fish and mammal bones were also found in most of these pits. Clay "caps" were associated with the largest of the basin-shaped pits, but interior zones were absent.

A number of pits intersected other structures. Pits 13, 28, and 54 overlay (54) or presumably destroyed (13, 28) postmolds of Palisade A. Palisade B was interrupted by pit 20. Pits 11 and 15-17 underlay Trench 2. However, all pits with one exception were assigned to the Grand River Phase component. A blade fragment, absence of pottery, and depth of orifice below plow zone (1.6 feet) indicate pit 49 belongs to an earlier, perhaps Archaic, component. This pit had a soil pH of 6.0, while all other pits were 7.0.

Figure 6. Examples of pit profiles (A-undercut pits: left to right 27, 45, 48, 63, 65; B-straight-sided pits: left to right 5, 25, 47, 66, 59; C-basin-shaped pits: left to right 37, 38, 44, 46, 68)

Feature	depth encountered below plow zone in feet	diameter			depth from orifice to base in feet
		orifice	neck	body	
undercut pits					
10	0.8	1.1	1.1	1.4	1.2
14	0.3	2.1	1.5	1.7	2.1
15	0.4	1.4	1.3	1.6	0.8
16	0.7	3.8	3.7	4.6	1.9
18	0.7	3.0	2.6	3.5	1.2
27	0.3	2.4	2.4	3.2	2.0
33	0.5	2.6	2.6	3.2	1.4
45	0.4	2.8	2.7	3.1	2.0
48	0.5	4.0	3.0	4.4	2.8
58	0.5	2.0	1.7	2.0	2.6
63	0.2	3.8	1.8	3.2	2.3
64	0.2	2.5	1.8	2.1	2.1
65	0.3	4.5	2.9	3.1	1.5
70	0.4	2.3	1.8	2.2	1.8
71	0.5	1.7	1.5	1.8	1.5
73	1.0	2.3	1.8	2.4	1.8
74	0.5	4.6	4.4	5.2	3.0
basin-shaped pits					
1	0.1	2.5	-	-	1.7
3	0.5	2.3	-	-	1.1
7	0.2	0.9 - 2.0	-	-	0.4
8	0.2	1.2	-	-	0.3
9	0.4	1.9	-	-	0.8
12	0.3	2.3	-	-	0.4
13	0.3	2.5	-	-	0.5
17	0.5	1.5	-	-	0.5
19	0.5	2.0	-	-	0.3
20	0.3	3.2	-	-	0.6
22	0.5	2.9	-	-	1.0
23	0.5	2.0	-	-	0.7
24	0.5	2.4	-	-	0.7
26	1.0	2.6	-	-	1.5
28	0.3	2.3	-	-	1.1
29	0.5	1.7	-	-	0.6
30	0.5	2.2	-	-	0.8
31	0.5	2.1	-	-	0.8
32	0.4	2.4	-	-	1.0
34	0.5	2.5	-	-	0.9
35	0.5	(2.2)	-	-	1.5

Table 1. Dimensions of pits

Table 1. (continued)

Feature	depth encountered below plow zone in feet	diameters in feet			depth from orifice to base in feet
		orifice	neck	base	
	basin-shaped (cont.)				
36	0.5	1.5	-	-	0.6
37	0.3	4.8	-	-	1.9
38	0.4	3.0	-	-	1.5
39	0.4	3.0	-	-	1.3
43	0.4	1.1	-	-	0.9
44	0.5	1.6	-	-	0.7
46	0.5	1.5	-	-	1.2
49	1.6	2.6	-	-	1.0
50	0.6	2.2	-	-	1.0
51	0.3	2.1	-	-	0.8
52	0.3	1.4	-	-	0.3
55	0.4	2.0	-	-	0.7
60	0.8	1.9 - 1.3	-	-	0.6
61	0.6	1.7	-	-	0.9
67	0.7	2.2	-	-	0.6
68	0.7	2.1	-	-	1.2
69	0.5	2.4	-	-	0.8
75	0.5	(2.4)	-	-	0.8
	straight-sided pits				
2	0.5	2.4	-	-	1.5
4	0.5	2.2	-	-	1.3
5	0.5	2.8	-	-	1.4
6	0.5	4.0	-	-	2.3
11	1.1	1.2	-	-	0.8
21	0.5	2.7	-	-	1.4
25	0.5	3.2	-	-	2.8
47	0.5	2.3	-	-	1.6
59	0.7	2.2	-	-	1.3
66	0.5	2.3	-	-	1.5

ARTIFACTUAL ASSEMBLAGE

Artifacts in the Walker-Hooper site assemblage have been classified in terms of four functional categories: tools for food procurement, fabricating and processing tools, recreational and ornamental artifacts, and containers. Table 52 lists the tools and other formal artifact classes included within each of these categories. These categories are not the only ones that could have been emphasized, nor was the function suggested here for some of the tools necessarily their only function.

A. Tools for Food Procurement

1. HUNTING TOOLS. Hunting tools consist of 93 stone and 6 antler projectile points. Stone points are the most numerous formal category of chipped stone artifact at the site.

a) UNNOTCHED TRIANGULAR POINTS (Plate 20, A-K). Seventy-eight points are "Madison Points." Table 2 contains the provenience and attributes of these points. A blank space in the table indicates that the attribute was not determinable due to breakage. Numbers in parentheses are actual measurements of broken points. Sixty-six of the points are isosceles in outline; twelve are skewed or scalene. Twelve points are quartzite (1, 8, 14, 18, 25, 36, 40, 53, 73, 76, 83, 84) and the remainder are chert. Seven whole points of this category found in the plow zone are included in the descriptive table.

b) NOTCHED TRIANGULAR POINTS (Plate 20, L and M). Two small triangular chert projectile points have side notches. Their provenience and dimensions are listed in Table 3 (1 and 17).

c) STEMMED AND NOTCHED POINTS AND TIP FRAGMENTS (Plate 20, N-Y). Fourteen whole and fragmentary points compose this category; four tip fragments have been included because of their unusual thickness and straight chipping of the edges. Table 3 contains the provenience and maximum dimensions of these artifacts.

Projectile points in this category can be subdivided on the basis of stem configuration, when this attribute complex is present. These subdivisons are STRAIGHT STEMMED (10 in Table 3; T in Plate 20), SIDE-NOTCHED (6; Plate 20, R), and CORNER-REMOVED EXPANDED-STEMMED

no.	unit/feature	level/house	weight in gms.	dimensions (mm.)			retouch		configuration		strik. platform	serrated sides
				length	width	thickness	on sides	on base	a - straight b - concave c - convex			
									sides	base		
1	F6	1	1.1	20.5	15	4	2	x	a	a	x	-
2	F37	1	0.7	15	14	3	2	x	a	a	-	-
3	F37	1	1.0	22	15	3	2	x	a	c	-	x
4	F37	2	0.7	13.5	13	3.5	2	-	c	a	-	-
5	F38	1		(tip)								
6	F47	1	0.8	16	13	3	2	x	a	a	-	x
7	F47	1	0.6	15	13	3.5	2	x	c	a	x	-
8	F50	1		17	14	4	1	-	a	a	x	-
9	F58	1	1.7	25	18	4	2	x	a	a	-	x
10	F63	4		16.5	-	4	1	-	a	a	x	-
11	F65	2		(tip)								
12	F66	2	1.0	17	13	4	2	x	c	a	-	-
13	F66	3	0.6	16.5	10	3.5	2	x	a	a	-	-
14	F69	2	0.7	16.5	5.5	2	2	x	c	a	x	-
15	F70	2		(15)	15	3.5	2	-	a	a	-	-
16	F70	2		17.5		2	2	-	a	a	x	-
17	F71	2	1.1	19	10	4	2	-	c	c	-	-
18	F74	1		(17)	(14)	3.5	2		a			x
19	F74	3		(20)	(14)	3.5	2		a			x
20	F74	3		20		4	2	x	a	a	-	x
21	F74	4	1.6	27	18.5	3.5	2	-	a	a	-	x
22	F74	4	2.3	32	19.5	4	2	-	a	a	x	-
23	76	HI		18	14	4	2	-	a	a	x	x
24	77	HI	0.6	13	13	3	2	x	a	a	-	x
25	78	HI		(tip)								
26	83	HI	0.6	16	15	3	2	-	a	a	x	x
27	83	HI	0.7	16	15	3.5	2	x	a	c	-	-
28	83	HI	1.1	19	12.5	5	2	x	a	b	-	-
29	83	HI		15.5	(13)	3	1	-	a	c	-	-
30	83	HI	0.7	15.5	12	2.5	2	x	a	a	x	x
31	84	HI		16.5	10	3	1	-	a	c	x	-
32	84	HI	1.2	24.5	17	3.5	2	-	a	a	x	x
33	84	HI	1.0	17	16	4	2	x	a	a	-	x
34	88	HI	0.9	18	14	3	2	x	a	a	-	-
35	88	HI	1.1	19	15	3.5	2	-	c	c	-	-
36	88	HI		18	15	3	2	-	a	b	x	x
37	89	HI	0.8	15	14.5	3.5	2	-	a	c	-	x
38	61	H2			17.5	4	2	-	a	a	x	-
39	62	H2	0.9	18	14.5	3	2	x	a	b	x	-
40	62	H2		(12)	12.5	2	2	x	a	a	x	-
41	65	H2	1.0	19	13	3	2	x	c	a	-	-

Table 2. Provenience and attributes of unnotched triangular points

Table 2. (Continued)

no	unit/feature	level/house	weight in gms.	dimensions (mm.)			retouch		configuration		strik. platform	serrated sides
				length	width	thickness	on sides	on base	a - straight b - concave c - convex			
									sides	base		
[illegible]	65	H2		(14)	13	2	2	x	a	a	-	-
[illegible]	57	H2		(tip)								
[illegible]	57	H2	0.9	18	16	3.5	2	x	c	c	-	-
45	57	H2	1.6	23	17	3.5	2	x	a	c	x	-
46	11	1		21		3.5	2	x	a	a	-	x
47	16	1		(18)	(10)	3	2		a			-
48	24	1	1.5	27	14	5	2	-	a	a	-	-
49	24	1		22	15	3	2	x	a	a	x	x
50	24	1	1.1	19	10	3	2	-	c	a	x	-
51	25	1		(18)	14	4	1	-	c	a	x	-
52	25	1	0.6	16.5	13	2.5	2	x	a	a	-	x
53	25	1		(14)	15	3.5	2	x	a	a	-	x
54	29	1	1.2	19.5	14	4	2	x	a	a	-	-
55	29	1			19	3.5	2	x	a	b	-	-
56	30	1	1.0	25	13	4	2	x	c	a	x	-
57	32	1		12.5	11	3.5	2	-	c	a	-	-
58	35	1		(15)	14	3.5	2	x	a	b	-	-
59	35	1		(18)	13.5	3	2	-	a	b	-	-
60	38	1		(17)	16	4	2	x	a	a	-	x
61	39	1		14.5	11	2	2	x	a	a	x	x
62	40	1	0.8	16	16	3	2	x	a	a	x	-
63	41	1	1.4	24	14	4	1	-	a	a	x	x
64	44	1		(13)	16	3	2	x	a	a	x	-
65	44	1		17		2	2	x	a	a	x	x
66	48	1		(tip)								
67	50	1	0.6	13	13	3	2	x	a	a	x	-
68	58	1		(18)	13	4	2	-	a	a	x	x
69	59	1	0.6	14	13	3	2	x	a	a	x	-
70	63	1	0.7	17	11	3	2	x	a	a	x	-
71	80	1		(17)	17	4	2	x	a	a	x	x
72	80	2	0.7	18	12	3	2	-	a	a	-	x
73	81	1		(15)	13	3	2	-	a	a	x	-
74	85	1	0.9	19.5	12	3.5	2	-	a	a	x	x
75	86	1		(14)	13	4	2	-	a	a	x	x
76	86	1		(13)	19.5	4	1	-	a	a	-	-
77	93	1-3	1.2	22	15	3	2	x	a	a	-	x
78	93	1-3	1.4	22	15.5	4	1	-	a	a	x	-
79	Sf		1.3	21	15	4.5	2	-	a	a	x	x
80	Sf		0.9	18	13	3.5	2	x	a	a	x	x
81	Sf		1.0	25	13	4	2	x	c	a	x	-
82	Sf		1.2	20	12	4	2	-	a	c	x	-
83	Sf		1.3	21.5	17.5	3	2	x	a	a	-	-

(2, 7?, 8?, 9, 13-16; Plate 20, N, O, R, U-Y). One point (14; Plate 20, O) is of the Durst Stemmed type (Wittry 1959:179-180). This projectile point type is regarded as being primarily of the Late Archaic period, but continuing in subdued use during the Middle Woodland in Wisconsin (ibid:255). Three points (2, 15, 16; Plate 20, V-X) exhibit impact shatter. One of these points (15) resembles a small Monona Stemmed point, probably belonging to the Middle Woodland period (Baerreis 1953:176; Wittry 1959:255).

d) ANTLER PROJECTILE POINTS (Plate 30, B). Six projectile points probably made from deer antler have carved exterior surfaces and either hollow or solid cores. Their proveniences and descriptions are: F50-L1 (broken, solid core, smooth surface), F50-L2 (25 mm. in length, hollow core, smooth surface), F70-L2 (28 mm. in length, hollow core, smooth surface with ridge around the middle), surface (broken, hollow core, smooth surface), Unit 24-L1 (broken tip), U76-L1 (31 mm. in length, hollow core, smooth surface).

2. FISHING IMPLEMENTS. Fishing implements consist

no.	unit/feature	level/house	haft width (mm.)	basal width (mm.)	shoulder width (mm.)	total length (mm.)	haft length (mm.)	thickness (mm.)
1	F13	NV	9	14	11	19	5	3
2	F48	5	16	18	21.5	(32)	11	8
3	F65	1	(tip)					
4	F65	2	(tip)					
5	F74	3	(tip)					
6	F74	4					13	7.5
7	77	HI	19	22			11	5
8	27	2	8			17		4
9	28	1	11.5	12	14	24	5	4
10	29	1	15		24		13	6
11	29	1	(tip)					
12	48	2			20			6
13	67	2	14		27	57	11	8
14	67	2	12	15	17	32	15	8
15	86	2	16	18	24	(35)	10	5
16	Sf		18	22	28	(39)	12	7
17	Sf		9	11	12	20	5	6

Table 3. Provenience and dimensions of notched and stemmed projectile points and tip fragments

of four small shell lures (Plate 32, A). Holes for the attachment of a line were drilled in the tail region and the upper head. Provenience: F59-L1, U93-L1 (2 lures), surface.

3. GARDENING AND DIGGING IMPLEMENTS. Implements for gardening and digging consist of four possible hoes. An implement that may have served as a hoe was found in the house fill of U57 (Plate 24, D). Although there is no shine or other sign of extensive use on the faces, its broad working edge is battered and crushed. Maximum dimensions are 97 x 76 x 15 mm. A fragment of another possible hoe from U13-L1 (Plate 24, C) is made from a reddish quartzitic material and resembles the upper half of a more convincing specimen of the same material from the plow zone (Plate 24, B). A basalt hoe with a glossy, striated working edge and surface is from the plow zone (Plate 24, A). The maximum dimensions of this latter hoe are 200 x 75 x 32 mm.

B. Fabricating and Processing Tools

1. STONE PROCESSING TOOLS AND DEBITAGE. Low quality chert of light to dark gray was the most common stone material in the chipped stone assemblage. Quartzite, the second most common stone, accounts for approximately fifteen percent of the sample; quartz, chalcedony, and other stone occurs in amounts less than one percent of the total chipped stone assemblage. The chert was obtained for the most part from local bedrock outcrops, glacial till, and stream deposits. Large green boulders underlie the sand covering the site at a depth of three to four feet, and natural flakes of this material are strewn throughout the C horizon. A distinctive form of adze probably belonging to an early component was manufactured exclusively from this kind of stone.

The chipped stone debitage reflects a non-blade, flake industry. Some lamellar blades and microblades were produced incidental to the tool-making process. Only 0.8 percent of the in situ debitage consists of pieces weighing 10 gms. or more. Chert and quartzite hunks in this weight class range from 10-50.8 gms., with most weighing between 10-20 gms. The largest piece of chert found at the site is a three pound flake core discovered in the plow zone. On the basis of the size distribution of debitage it would seem that relatively small hunks of raw material were being brought to the site, fashioned into cores, and rapidly depleted.

category	frequency	percent
decortication flakes	132	3.2
shatter	240(247)	5.9
bipolar flakes	97(115)	2.4
bipolar cores	41	1.0
non-bipolar cores	20	0.5
utilized flakes	597	14.6
other unused flakes	2955	72.4
(chips)	(474)	
total	4082	100.0

total weight* . . . . . 6890.8 gms.

*decortication flakes not included

Shatter and bipolar flakes showing use or secondary pressure retouch are tallied with utilized flakes; the actual frequencies of the formal classes shatter and bipolar flake are noted in parentheses. Chips have been excluded from the debitage total, for their frequency is directly related to the amount of flotation undertaken in various areas of the site.

a) DECORTICATION FLAKES. Flakes having unmodified cortex covering one face were not weighed. These flakes should probably be regarded as a sub-category of trim flake detached incidental to the tool-making process (McPherron 1967:135). The distribution of decortication flakes is recorded in Table 56. Small cortex remnants appear on approximately three percent of the remaining debitage. Cortex evidently was not regarded as a detriment to tool efficiency, for it covers one face of several artifacts.

b) SHATTER. Shatter consists of angular and cubical chunks of stone lacking bulbs of percussion and signs of deliberate modification. This form of debitage is apparently a product of the initial percussion used to shape raw material (Binford and Quimby 1963:286-287). All specimens are chert, except for one each of quartz and quartzite. Most of the shatter is relatively large and possesses small cortex remnants. Table 56 contains the distribution of this category of debitage.

c) BIPOLAR FLAKES AND CORES (Plate 13). Ninety two flakes and forty-one cores are refuse products of a bipolar flaking technique. This technique involves placing a

core on an anvil and striking the free end, producing two opposing striking platforms or zones of percussion as the striking force rebounds from the anvil battering the opposite end. There are apparently a number of methods of producing a similar effect, but the technique is essentially a way of utilizing pebbles, thick flakes, core fragments, and other materials too small to be easily worked by other techniques (Binford and Quimby 1963; McPherron 1967:128-144; MacDonald 1968:69).

Twenty-two of the forty-one bipolar cores can be classified as polyhedral and the remaining nineteen as flat (McPherron 1967:135). None of the cores seem to have been utilized as tools, although their edges are often sharp enough to have served a cutting function. Polyhedral cores may represent flat cores trimmed down to an exhausted cylinder shape. McPherron noted a significant difference in an analysis of variance of length between the two core types in his sample, with flat cores being the larger (1967:138-139). This difference seems to be absent at the Walker-Hooper site, at least at the 5% level using a two-sided test of significance (Table 4). Four cores found in the plow zone are included in the test.

Table 4. Analysis of variance in length between bipolar core types

	polyhedral cores	flat cores
ΣX	526.0	511.0
ΣX^2	11,734.0	12,831.0
N	24.0	21.0
$\bar{X}$	21.9	24.3
s	2.9	4.3

$F = 2.2$

(not significant at the 5% level using a two-sided test)

Bipolar flakes are for the most part irregular in form. Of the ninety-two bipolar flakes, only eighteen show signs of use in the form of nibbling or secondary retouch. Bipolar flakes range in length from 42-13 mm., with a mean

length of 22 mm. There are probably more than ninety-two flakes struck from a bipolar core, for only those specimens that definitely have attributes of a bipolar flake were counted. Flake scars on many cores clearly demonstrate that flakes did not always extend the length of the core. As a result, battering or other attributes of the technique would not always appear on both ends of the flake, although the core would continue to shatter at its base. The distribution of bipolar cores is contained in Table 56.

d) NON-BIPOLAR CORES (Plate 14). Twenty non-bipolar cores of variable shape and size were uncovered in situ. Their irregularity reflects the lack of standardization in the types of flakes produced. The provenience, maximum dimensions, and weight of non-bipolar cores are recorded in Table 5. A few of these cores still have cortex covering one face (10, 12, 16, 17, 20, 21, 23, and 28 in Table 5). The core in the stockade line (20) was one foot below the surface north of F54.

e) OTHER UNUSED FLAKES AND CHIPS. The remaining unused flakes have been separated by material and placement of striking platform or bulb of percussion (Table 57). These flakes range in weight from a 51 gm. chunk of blue quartzite to flakes 0.5 gms. Most flakes weigh less than 10 gms.

	without	site total
CHERT	1717	2433
QUARTZITE	393	488
QUARTZ	30	34

Chips are small flakes weighing less than 0.5 gms. and of such a size that they easily fall through a quarter-inch mesh. The number of chips found was directly influenced by the amount of flotation undertaken. The distribution of chips by material composition and placement of striking platform and/or bulb of percussion is recorded in Table 57.

	end-struck	side-struck	without	site total
CHERT	81	50	280	411
QUARTZITE	6	10	47	63

f) BLANK (Plate 19, F). A relatively large end-struck flake from U24-L1 may be a blank intended for additional modification. The flake resembles an end scraper with a flat ventral surface and a keeled dorsal surface. Maximum

dimensions are 48 x 27 x 15 mm.

g) HAMMERSTONES (Plate 21). Sixteen irregular stones with crushed and battered surfaces may have served as hammering tools. Table 6 contains the provenience, weight, and maximum dimensions of this category of artifact. Hammerstones 1-6 are roughly spherical in configuration (Plate 21, A-C); the remaining stones are irregular in shape, with the exeption of no. 12 (Plate 21, D).

h) STONE ANVIL (Plate 22, E). Multiple pits on a roughly sperical stone from the plow zone suggest that this implement served as an anvil. Maximum dimensions

no.	unit/feature	level/house	weight in kilograms	length (mm.)	width (mm.)	thickness (mm.)	material composition
1	F6	3	6.05	124	89	38	gray chert
2	F48	4	.08	26	22	15	gray chert, cortex
3	F74	4	.30	41	38	21	white chert, cortex
4	84	H1	.05	22	18	13	gray chert, cortex
5	85	H1	.21	33	33	16	gray chert
6	62	H2	.11	26	23	17	gray chert
7	11	1	.05	28	14	12	tan-orange chert
8	24	1	.17	29	27	18	gray chert, cortex
9	26	1	.17	34	30	27	white chert, cortex
10	28	1	.08	34	24	10	gray chert, cortex
11	40	1	.03	30	13	9	tan chert
12	45-6	2	.07	25	23	14	white chert, cortex
13	48	1	.04	19	19	13	white chert, cortex
14			.15	41	33	10	white quartzite
15	54	1	.31	40	39	20	gray chert
16	56	1	.05	18	15	13	gray chert, cortex
17		2	1.50	73	45	41	brown chert, cortex
18	64	1	.38	47	31	22	white chert
19	93	1-3	.13	30	25	19	white chert
20	stock.	1	1.07	66	39	36	white chert, cortex
21	Sf.		13.44	155	90	90	gray chert, cortex
22			1.86	78	51	36	green stone
23			.80	53	47	29	white-gray chert
24			1.30	62	52	32	gray chert
25			.21	35	27	26	gray chert
26			.22	36	35	13	gray-white chert
27			.37	37	36	24	gray-white chert
28			.10	29	18	16	white-orange chert

Table 5. Provenience, weight, and maximum dimensions of non-bipolar cores

no.	unit / feature	level / house	weight in gms.	maximum dimensions in mm.		
				length	width	thickness
roughly spherical in shape						
1	F 10	NV	510	83	76	52
2	F 58	4	164	63	49	38
3	45	1	218	62	53	46
4	Sf	-	222	63	60	45
5	Sf	-	363	65	63	62
6	Sf	-	376	75	70	53
other shapes						
7	F 6	1	98	54	52	41
8	F 10	NV	1400	108	101	85
9	F 50	1	372	83	66	44
10	F 63	NV	217	80	49	41
11	F 74	4	215	68	60	33
12	F 74	5	366	105	54	40
13	63	2	247	77	48	47
14	Sf	-	189	72	56	28
15	Sf	-	487	78	66	53
16	Sf	-	900	114	76	63

Table 6. Provenience, weight, and maximum dimensions of hammerstones

of this stone are 72 x 71 x 48 mm. Pitted stones are usually associated with the bipolar technique of flaking, serving as anvils; this stone may have served in this capacity.

i) DETACHED DEER TINES (Plate 30, A). Thirteen detached deer tines may have been used as hafted flakers. It is difficult to be certain that all of these tines were actually used as tools, for natural tines are also often polished, rounded, and marred. The provenience of ten complete tines with flat, cut bases is: F9-NV, F59-L1, F63-L3, F65-L1, F74-L3, F74-L4, H62 (two tines), U85-L1, surface. Three cut and broken midsections are from F16-NV, F48-L1, and H77.

2. WOOD-BONE WORKING TOOLS. Wood-bone working tools consist of thirteen wedges, six gouges, twenty-nine notched flakes, nine flake gravers, four split beaver teeth incisors, eleven sandstone abraders, one celt, and eight adzes.

a) WEDGES (Plate 13, C). Thirteen rectangular implements exhibiting bipolar flaking seem to have been

no.	unit / feature	level / house	length (mm.)	width (mm.)	thickness (mm.)	material composition
1	F37	3	18.5	17	7	tan chert
2	F46	1	22	18	5	gray chert
3	F50	1	16	12	5	tan chert
4	F50	2	24	21	5	lt. tan chert
5	F51	1	23	19	6	gray chert
6	F74	4	24	16	6	gray chert
7	71	H-1	19	13	5.5	tan chert
8	76	H-1	18	12.5	4	white chert
9	78	H-1	16	(10)	4	white chert
10	83	H-1	23	23	4	gray chert
11	84	H-1	27	19	7	white quartzite
12	35	1	-	21	5	white chert
13	Sf.		23	18	6	white chert

Table 7. Provenience and dimensions of wedges

purposely squared. Burin blows appear on several, but they are probably the result of the flaking technique in which overlapping columnar fractures give the appearance of an implement functioning as a burin. Wedges as a class are difficult to separate from some flat bipolar cores. The distinguishing attribute used to separate them is the presence of retouch along the sides of the wedge, apparently intended to prepare or shape the implement. Table 7 contains the proveniences and dimensions of wedges. All are fashioned from chert with the exception of a white quartzite specimen (11 in Table 7).

These chipped stone artifacts may have functioned as wedges or slotting tools in a bone-antler-hardwood tool complex employing a groove and splinter technique of manufacture (Clark and Thompson 1953; Semenov 1964: 148-149; MacDonald 1968:85-90). In Wisconsin, Ronald Mason has described a class of "quadrangular implements," that may be similar tools (1966:65, Pl. VIII; 1967:303, 319-320; 1968:159). A wedge is also illustrated from a Late Havana Hopewell site in southern Wisconsin, the Cooper Shore site (Wiersum 1968: Fig. 8, H).

b) GOUGES (Plate 16, C). Six chert flakes have a concave, gouged-out area on one end (4) or on one side (2). This working area was formed by battering and crushing.

and ranges in width from 8-16 mm. The distribution of the flakes is F61-NV (2 gouges), H60, U30-L1, U44-L1, U73-L1. Three of the flakes are products of the bipolar technique (one from H60, U44-L1, U73-L1). The dorsal surface of two specimens appear intentionally shaped and may represent a more standardized tool type (one from H60 and U44-L1).

c) NOTCHED FLAKES (Plate 16, D). Twenty-nine chert flakes exhibit shallow indentations or notches formed through use or retouch. Notches range in width from 3-10 mm. and in depth from 1-5 mm.; flake length ranges from 14-33 mm. The varied shapes and sizes of the flakes suggests, that they were probably picked from the unworked debris. All of the notches have use or retouch around their edges. Their proveniences are listed in Table 56.

d) FLAKE GRAVERS (Plate 13, E). Nine small irregular chert artifacts that have one edge modified to form a short, sharp triangular point are classified as flake gravers. These implements lack a standardized form except for the projection, which appears to have been deliberately chipped from only one side. Their provenience and dimensions are recorded in Table 8.

e) SPLIT BEAVER TEETH INCISORS (Plate 29, D). Four cut and split beaver teeth incisors bear signs of heavy wear on both ends and along the split surface. This tool was probably hafted and used as a wood-working chisel. Additional beaver teeth were split, but these lack signs of use

no.	provenience			length of spur in mm.	width of spur at base in mm.	dimensions in mm.			color
	unit	feature	level			length	width	thickness	
1	-	46	1	1	2	13	7	3	white
2	-	51	1	1	2	17	11	3	tan
3	-	59	1	2	2.5	18	14	4	white
4	78	H-1	-	5	6	22	16	5	white,cortex
5	84	H-1	-	2	4	24	15	8	white, gray
6	89	H-1	-	1	2	20	15	7	tan
7	58	H-2	-	2	4	14	12	2	tan, white
8	41	-	1	1.5	3	9	7	3	blue-gray
9	81	-	1	4	3	14	10	4	white

Table 8. Provenience, color, and dimensions of flake gravers

no.	provenience			dimensions in mm.		
	unit	feature	level	length	width	thickness
1	-	6	NV	57	34	23
2	-	45	2	37	35	10
3	-	58	1	71	40	28
4	-	trench 2	NV	48	44	24
5	71	H-1	-	45	34	27
6	83	H-1	-	35	29	20
7	83	H-1	-	42	40	30
8	48	-	1	47	28	26
9	85	-	1	31	27	23
10	85	-	2	91	75	33
11	76	-	1	43	41	23

Table 9. Provenience and dimensions of sandstone abraders

as tools. Provenience: F48-L2, F59-L1, U24-L1, U38-L1.

f) SANDSTONE ABRADERS (Plate 22). The distribution and dimensions of the eleven sandstone abraders found at the site are recorded in Table 9. The variety of grooves and gashes on these implements suggests a number of uses, such as shaft polishing and awl sharpening. Only one abrader (4 in Table 9) with a single large semi-circular central groove approaches the general shape of a "paired" shaft abrader (Plate 22, A). The central groove measures 8 mm. in width and 3 mm. in depth. Both surfaces are also criss-crossed by fainter and narrower lines. The remaining abraders are irregular in shape and contain multiple narrow V-shaped grooves.

g) CELT (Plate 19, G). An incomplete slate celt with nearly flat, heavily ground faces came from F58-L5.

h) ADZES (Plate 18). Eight stone implements made from large flakes chipped from the green boulders strewn throughout the C horizon are tentatively classified as adzes. The provenience and maximum dimensions of these artifacts are recorded in Table 10. Seven are plano-convex in cross section and one is biconvex. Wear striations are absent, although the transverse sinuous working edges exhibit unifacial crushing on the flat surface of five of the adzes.

3. DRILLING-PERFORATING TOOLS. Seventy-one flake drills, eight chipped stone perforators, five bone punches or needles, and twenty-four bone awls comprise this functional category.

no.	unit / feature	depth below surface	length in mm.	width in mm.	thickness in mm.
1	F63	.5-1'	105	43	23
2	H-1 u77	.5'	93	54	28
3	39	.9'	144	49	39
4	81	.1-.5	(55)	50	30
5	91	2.5'	76	48	12
6	Sf		85	45	20
7	Sf		90	46	29
8	Sf		93	47	19

Table 10. Provenience and maximum dimensions of adzes

a) FLAKE DRILLS (Plate 13, D). Seventy-one flakes exhibit continuous bifacial (9) or unifacial (62) wear or secondary retouch along the margins of a thin natural point. Except for three side-struck and one end-struck flakes, all lack a striking platform and bulb of percussion. The flakes, all of chert with the exception of one unifacially retouched quartzite drill and one bifacially retouched quartz drill, range in length from 12-58 mm. The distribution of flake drills is recorded in Table 56.

b) CHIPPED STONE PERFORATORS (Plate 13, F). Eight modified flakes with very steep edge retouch around one narrow, elongated end are classified as perforators. All of these artifacts have expanding bases. Their distri-

no.	unit / feature	level / house	length of drill point	width of point at base	dimensions in mm.			material composition
					length	width	thick-ness	
1	F70	2	-	-	19	11	7	gray chert
2	F74	4	-	-	20	12	4.5	gray chert
3	29	1	(tip)	-	-	-	-	tan chert
4	30	1	5	7	15	11	3	gray chert
5	35	1	-	11	(21)	20	7.5	white chert
6	39	1	-	-	22	12	5	white chert
7	73	1	11	7	23.5	15	3	white quartzite
8	78	2	(7)	9	20	14	5	white chert
9	Sf		(9)	12	(24)	18	6	white chert

Table 11. Provenience and attributes of chipped stone perforators

bution, dimensions, and material composition are recorded in Table 11.

c) BONE PUNCHES OR NEEDLES (Plate 28, C). Five rounded and polished slivers of bone have been sharpened at one or both ends: F37-L3 (one end, 25 mm. in length), F66-L1 (one end of broken shaft 42 mm. in length), F65-L2 (one end, 45 mm.), H65 (one end of broken shaft 74 mm. in length), U83-L2 (bipointed shaft 70 mm. in length).

d) DEER ULNA AWL (Plate 26, B). A single deer ulna from H58 is 122 mm. in length and from the animal's left side.

e) DEER METAPODIAL AWLS (Plate 26, C). The shafts of four deer metapodial bones have been modified by cutting and grinding into tapering points. Their proveniences and dimensions are: F23-NV (distal end and shaft of left metatarsal, broken), U27-L1 (distal end and shaft of right metacarpal, length 119 mm.), U59-L1 (shaft of broken metatarsal), U85-L1 (shaft of broken metatarsal).

f) DEER SCAPULA AWLS (Plate 27, A). Thick sections along the lateral border of four deer scapulae have been shaped into long tapering awls. The proveniences and descriptions of these awls are F65-L1 (broken, right scapula), F65-L1 (broken, left scapula), H83 (right scapula, length 108 mm.), H60 (right scapula, length 140 mm.).

g) CANINE ULNA AWL (Plate 27, B). A single right canine ulna awl 114 mm. in length came from H60.

h) BIRD BONE AWL (Plate 27, C). The fibula from the left (?) leg of a swan has been modified into a sharp tipped awl. This tool is from H83.

i) FLAT SPLINTER AWLS (Plate 27, D). Eight flat splinters from unidentified mammal species were modified into awls. The provenience and length of these tools are F38-L2 (broken), F48-L2 (157 mm.), F69-L1 (broken), H78 (broken), H83 (broken), H64 (broken), U42-L1 (49 mm.), and U82-L1 (broken).

j) MISCELLANEOUS AWL FRAGMENTS. Tips of five awls are too small to reliably assign to mammal species or awl types: F47-L2, F51-L1, H72, U30-L1, U63-L1.

4. MAT-FABRIC MANUFACTURING TOOLS. The only mat-fabric manufacturing tools found at the site with the possible exception of some of the bone awls were twelve pottery discs with temper and paste similar to that of the large shell-tempered jars which comprise most of the

ceramic assemblage (Plate 11, C). The discs were separated into three groups: holes were drilled through the center of five discs (F37-L4, F45-L1, H77, H61, U42-L1); three have light depressions on either side of the disc center (F69-L2, F74-L3, H84); three lack holes or depressions (F65-L1, F74-L4, F50-L1). A fragment of a disc perimeter was also found on the surface. Disc diameters range between 20-39 mm., with most measuring between 20-26. mm.

5. POTTERY MANUFACTURING TOOLS AND WASTE. Pottery manufacturing tools and waste consist of fired lumps of clay, a stone pottery polisher, and a muskrat tooth used to grind the wash applied to several of the jars.

a) CERAMIC WASTE (Plate 8, H). 250 small pieces of untempered fired clay were scattered throughout the site debris (Table 55). A large lump of fired clay with limestone and fired clay temper may represent a by-product of the vessel manufacturing process or daub used on one of the structures (Plate 10, A). The lump was associated with F54-NV along the stockade line and measures 91 x 72 x 20 mm. A large cinder (68 x 65 x 46 mm.) with quartzite inclusions came from U72-L2. Its use is also not clear.

b) STONE POTTERY POLISHER (Plate 19, C). A very smooth rectangular pebble may have served as a polisher. The smooth faces exhibit some signs of wear, although the origins of the wear are not clear. The pebble is from F6-NV.

c) MUSKRAT TOOTH GRINDER. An unmodified muskrat tooth from H83 has black wash covering the crown end. This tool may have been hafted and used to grind the wash used to cover portions of some of the large jars.

6. GENERAL CUTTING AND SCRAPING TOOLS. General cutting and scrapping tools at the Walker-Hooper site consist of twenty-one bifacial knives, eighteen chipped stone scrapers and one pebble scraper, twenty-five shell scrapers, four hundred and ninety-one side and end retouched flakes, six deer jaw sickles, seven deer metapodial beamers, and a deer humerus "gouge."

a) BIFACIAL KNIVES. Nineteen whole and fragmentary stones with double-beveled sinuous working edges and two flaked faces are classified as knives. The proveniences, dimensions, and material composition of these artifacts in addition to two found on the surface are tabulated in Table 12.

SMALL OVATE KNIVES (Plate 17, A, B, H, I). Five knives (2, 3, 6, 7, and 15 in Table 12) are ovate in outline and under 50 mm. in length. Two fragments (9, 10) may be bases and a third a tip (13; illustrated in Plate 17, G) of this category of implement.

KOLTERMAN INDENTED BASE KNIVES (Plate 17, K and L). One knife (18) and probably another (1) resemble the type Kolterman Indented Base (Wittry and Bruder 1955; Wittry 1956, 1959:185-186). The indented base on the complete specimen (18) is the result of unifacial crushing; the base indentation is 18 mm. long and 3 mm. deep. This knife type has been tentatively associated with the Effigy Mound Tradition on the basis of a find in an otter effigy mound containing Madison Cord Impressed pottery at the Kolterman site in Dodge County (ibid.). An associated cremation provided a radio-carbon determination of A.D. 726 ± 250 (Wittry 1956).

no.	unit/feature	level/house	length (mm.)	width (mm.)	thickness (mm.)	material composition
1	F37	4	50	-	6	white quartzite
2	F48	1	43	(26)	4	yellow quartzite
3	F48	5	26	16	4	gray chert
4	F49	NV	(mid-sec)			chalcedony
5	F63	1	(tip)			chert
6	F63	3	19	12	5	orange chert
7	F70	1	21	13	4	gray chert
8	76	HI	(base)	(20)	(6.5)	red quartzite
9	83	HI	(base)	-	(9)	white quartzite
10	34	1	(base)	(23)	-	white quartzite
11	34	1	(tip)	-	-	chert
12	44	1	(side)	-	-	white quartzite
13	48	1	(tip)	-	(8)	white quartzite
14	57	4	(mid-sec)	(23)	(11)	white chert
15	72	1	49	32	7	white quartzite
16	72	2	(tip)	-	-	chert
17	85	1	(59)	31	13	gray chert
18	86	3	56	33	9	gray chert
19	95	1-3	-	(40)	14.5	white quartzite
20	Sf		(tip)	-	-	chert
21	Sf		49	21	12	white quartzite

Table 12. Provenience, maximum dimensions, and material composition of bifacial knives

KNIFE FRAGMENTS (Plate 17, C-E, J, M). Three fragmentary knives (4, 14 and 17 in Table 12) may represent a separate category with elongated parallel sides (Plate 17, D and E). The remaining fragments (5, 8, 11, 12, 16, 20) are too small to reliably classify, except for two fragments which form a large ovate knife (19; Plate 17, M).

An irregular knife found on the surface (21; Plate 17, F) and the parallel-sided large ovate knife (19) have cortex remnants on one side.

b) SCRAPERS. Eighteen flakes with steep marginally retouched working edges were recovered from the site. Twelve have transverse working edges and are classified as end scrapers. The remaining six are side scrapers with longitudinal working edges.

END SCRAPERS (Plate 16, A). Table 13 contains the provenience, configuration of cross section, extent of lateral retouch, maximum dimensions, presence or absence of "spurs," and working length of end scrapers. The working length is an estimate of the relative convexity of the transverse working edge and is obtained by measuring the longitudinal distance between the distal end and the axis of maximum width of the functional area (White 1963: 41). Some end scrapers have one or two graver-like projections or spurs on the working edge. These projections may be functional or the result of hard use and subsequent retrimming of the working edge. Three of the scrapers (1, 3, 12 in Table 13) have a double-beveled working edge along one side and may have served as "scraper-knives" (Plate 16, left and second from right in top row, second from right in bottom row).

All of the end scrapers are chert except for one of red quartzite (12 in Table 13; Plate 16, left in top row A). Three scrapers have cortex covering much of their dorsal surface (6, 7, 12) and a fourth (2) has a cortex remnant covering a small part of one side.

SIDE SCRAPERS (Plate 16, B). Provenience, length of working edge, and maximum dimensions of these chert implements are listed in Table 14. One side scraper (4), a surface find, is probably a reworked core. Two scrapers (3, 4) have cortex covering their dorsal surfaces.

c) PEBBLE SCRAPER (?) (Plate 19, B). A pebble from U38-L1 has two steep flakes chipped off one end. Although the chipped end resembles a scraping edge, it is

no.	unit/feature	level/house	cross section	lateral retouch		dimensions in mm.			spur present	working length	color
				left	right	length	width	thickness			
1	F31	NV	A	+	*	13	13	4	x	1	lt. tan
2	F48	3	A	-	-	(15)	12	9	x	3	gray
3	F48	4	A	*	+'	29	21	7	x	8	white
4	83	HI	A	-	+	19	19	3		3	gray
5	40	1	C	+	-	32	18	7	x	3	gray
6	73	1	C	+	+	28	20	10	x	1	white
7	75	1	B	-	+	21	19	6		4	white
8	75	2	B	+	+'	32	26	7	x	11	tan
9	95	1-3	A	+	+	23	19	7		2	white
10	95	1-3	A	+	+	18	18	6	x	2	white
11	Sf		A	+	-	21	16	6		3	white
12	Sf		B	*	+	44	30	9		11	red

- no secondary retouch
+ secondary retouch along the entire edge
+' retouching executed from the ventral surface
* bifacial retouching
A maximum thickness adjoins the scraping edge; sloping dorsal surface
B thickness uniform over at least half the scraper length; dorsal surface flat or longitudinally ridged
C highly irregular dorsal surface

Table 13. Provenience and attributes of end scrapers

no.	unit / feature	level / house	length of working edge	lateral retouch		dimensions in mm.			color
				left	right	length	width	thickn.	
1	36	1	22	-	-	49	28	9	white, orange
2	64	1	14	+	-	21	13	4	white, orange
3	Sf	-	42	-	-	48	35	10	gray, red cor-
4	Sf	-	46	-	-	64	54	25	tex; white
5	Sf	-	16	-	-	17	12	7	gray
6	Sf	-	15	-	-	34	23	12	white, pink

Table 14. Provenience and attributes of side scrapers

difficult to determine the function of the object - if any. Maximum dimensions are 52 x 11 x 9 mm.

d) SHELL SCRAPERS (Plate 31. A, Eleven whole

and fourteen broken shells have scraping striations along their edges and may have been used as corn shellers, fish scalers, or in some similar function. The provenience and description of the complete scrapers are F37-L2 (2 left and 1 right valve of LIGUMIA RECTA), F38-L2 (left LIGUMIA RECTA valve), F45-L1 (right LIGUMIA RECTA valve), F65-L1 (left valve), F69-L2 (left AMBLEMA COSTATA valve), U35-L1 (left LIGUMIA RECTA valve), U73-L1 (left AMBLEMA COSTATA and right LIGUMIA RECTA valve), surface (right STROPHITUS RUGOSUS valve). Broken shell scrapers are from F32-L2, F38-L2, F48-L3, F48-L5, F70-L2, H89 (2 scrapers), U24-L1 (2 scrapers), U30-L1, U34-L1, U93-L1 (2 scrapers).

e) SIDE AND END RETOUCHED FLAKES (Plate 15). The remainder of the worked and utilized flakes have been divided into a number of categories depending on whether the flake is side-struck, end-struck, or lacks a striking platform and/or bulb of percussion, and whether the wear is along the sides (354 flakes), the ends (107 flakes), or both an end and a side (30 flakes). The distribution and frequency of these various sub-categories are recorded in Tables 56 and 58. Like the other utilized flakes, a standardized form or size is lacking. These flakes range in length from 10-65 mm.

f) DEER JAW SICKLES (Plate 26, A). Six deer jaws are complete enough to reliably assign to this artifact class (left mandible: F37-L1, F75-NV; right mandible: H78, U50-L1, U85-L2, U89-L1). Six additional jaws are probably sickles, but their fragmentary condition precludes a positive identification (F6-L2, F46-L1, F47-L1, F48-L1, F75-NV, U12-L1). This tool was probably hafted and used as a sickle for cutting grass and other fibrous material (Pillaert 1963; Brown 1964, 1967:31-32). Considerable wear and bone loss has occurred along the entire mandibular base. The bases of only two specimens (F46-L1, U85-L2) remain intact, but even these are heavily worn and polished. Unusual wear is also observable on the occlusal surfaces of the cheek teeth.

g) DEER METAPODIAL BEAMERS (Plate 28, D). The provenience and description of seven broken "cannon bone" beamers found at the site are F6-NV (left metatarsal, proximal end), F74-L3 (left metatarsal, distal end and shaft), H62 (right metatarsal, distal end and shaft), U30-L1 (left

metatarsal, proximal end), U44-L1 (metatarsal fragment, shaft), U85-L1 (left metatarsal, proximal end), U86-L1 (metatarsal fragment, shaft).

h) DEER HUMERUS "GOUGE" (Plate 28, A). The distal end and shaft of a right humerus 80 mm. in length from H83 has been modified into a tool with a worn and polished shaft-end.

7. GENERAL FOOD PROCESSING IMPLEMENTS. Implements in this category consist of eight grinding stones, a pecking stone, six shell spoons, and a clay spoon or ladle.

a) GRINDING STONES (Plate 22, F; Plate 23, A-C). Eight rocks of igneous and sedimentary materials with one or both faces apparently flattened by abrasion are classified as grinding stones. The provenience, weight, and maximum dimensions of these artifacts are tabulated in Table 15. One specimen (4 in Table 15) may be a broken mano, having a round outline and one flat face (Plate 22, F). The remaining grinding stones are irregular in shape and size. A surface find (8) has one shiny, concave face formed through extensive wear (Plate 23, A); one end has been used for battering.

b) PECKED STONE. A large stone with pecking on two surfaces is from U85-L1. A thin film of red material, possibly hematite, covers one of these surfaces.

c) SHELL SPOONS (Plate 31, B). Two kinds of shell spoons were found. Both conform to types proposed by J.W. Griffin for spoons in northern Illinois (1946:35). Two specimens (type Ia) have a single notched tang on the anterior margin (F65-L2, right valve; H58, left valve). The

no.	unit / feature	level / house	weight in gms.	maximum dimensions in mm.		
				length	width	thickness
1	F37	2	115	54	44	28
2	F57	NV	650	105	77	47
3	79	H-1	250	72	68	32
4	83	H-1	-	92	-	45
5	63	2	82	54	37	29
6	Sf	-	230	74	54	33
7	Sf	-	246	80	61	34
8	Sf	-	1040	145	65	60

Table 15. Provenience and attributes of grinding stones

remaining four spoons are variations of Griffin's type II. Two have a double tang (type IIa) formed by modification of the lateral and pseudo-cardinal teeth (F55-NV, left valve; U45-L1). Two specimens resemble the double tang spoons except for multiple notches along one margin. These two type IIb spoons are from F70-L2 and U85-L2 (left valve).

d) CLAY SPOON OR LADLE (Plate 8, E). A portion of a crude, shell-tempered, hand-molded spoon or ladle came from F69-L1.

C. Recreational and Ornamental Artifacts

1. HUMAN TOOTH PENDANTS (Plate 29, B). Two human molar teeth have grooves carved around their roots, presumably for suspension (F65-L3: left lower second molar; F74-L3: left upper second molar).

2. CANINE TOOTH PENDANT (Plate 29, C). A worked canine tooth pendant came from F66-L1.

3. GROUND STONE PENDANTS (Plate 25, E-G). Two ground slate pendants were discovered in situ. One from U63-L2 is 54 mm. in length, 4 mm. thick, 35 mm. in width at the base, and 21 mm. in width at the top. The second pendant is from H89 and has maximum dimensions of 34 x 11 x 7 x 5 mm. Three pieces of worked slate from F47-L2, and F75-NV are not finished items (Plate 25, G).

4. BIRD BONE TUBES (Plate 29, A). Three polished bird bone tubes may represent ornaments. Their proveniences and lengths are F68-L1 (34 mm.), H79 (19 mm.), and H83 (36 mm.).

5. CLAY EAR SPOOL (Plate 8, F). A small piece of an ear spool or labret came from F37-L3.

6. COPPER BEADS AND FLAKES (Plate 25). A small number of copper waste flakes and ornaments were present among the site debris (Table 16). Four "pendants" were found back to back, with the largest on one side and the smallest on the other. Ovoids are tightly rolled or folded implements, whose function is not apparent. One specimen has a shiny surface presumably acquired through use.

7. GALENA. Seven galena cubes were found in the two house areas: F32-L1, F74-L4 (two), H83, U30-L1, U35-L1, U45-L1.

8. CLAY PIPES (Plate 8, G). Fragments of a shell-tempered clay elbow pipe were found in F34-NV and U38-L2. A few fragments of a nearly identical pipe came from U25-L1.

no.	unit/feature	level/house	maximum dimensions in mm.			item
			length	width	thickness	
1	F3	2	15	13.5	0.5	flake
2	F37	4	9	4	0.5	flake
3	F38-9	2	11	6	-	tubular bead
4	F59	1	13.5	7	0.5	flake
5	F59	1	10.5	3	0.5	flake
6	F66	1	2	1	0.5	flake
7	F69	2	19	4.5	4	ovoid
8	F70	2	6	6	0.5	rolled flake
9	F74	5	30	12	0.5	'pendant'
10	F74	5	25	11	0.5	'pendant'
11	F74	5	17	10	0.5	'pendant'
12	F74	5	17	8	0.5	'pendant'
13	71	H1	25	4.5	2	ovoid
14	84	H1	19	3	2	ovoid
15	58	H2	9	7	0.5	flake
16	60	H2	7	3	0.5	flake
17	61	H2	12	6	-	tubular bead
18	11	1	30	4.5	4	ovoid
19	29	1	10	11	0.5	flake
20	34	1	26	12.5	0.5	flake
21	44	1	22.2	12	4	lump
22	54	1	14	4.5	1.0	flake
23	54	1	23	8	0.8	flake
24	67	1	17	6	0.5	flake
25	Sf		295	9	-	awl

Table 16. Provenience and maximum dimensions of copper flakes and ornaments

9. PAINT STONES. Four stones contain a residue on one flat surface and are tentatively classified as paint stones, although the actual origin and purpose of the residue is unclear. A limestone specimen from F68-L2 and one of granite from U26-L1 (Plate 23, D) have a red residue covering one flat surface. A small stone in F48-L4 has a black residue, while a white and gray residue adheres to the flat surface of a stone from F57-NV.

10. LIMESTONE BALL (Plate 19, D). A small, almost perfectly round limestone ball 15 mm. in diameter is from U26-L1.

D. Containers

Ceramics are the most abundant category of artifact at the site. A disproportionate amount of time was spent

attempting to associate sherds, so that vessels, rather than sherds, could seve as the basis of an analysis. This effort met with little success, for vessel fragments were apparently scattered widely over the site - an observation also mentioned by Pasco (1932:101). Attributes were chosen as the initial method of describing the material for several reasons: 1) to facilitate a detailed description of the large number of sherds, most of which are too small to use in a typological analysis; 2) to provide a source of data from which horizon markers and culture specific patterns can eventually be identified by inter-site comparisons. Oneota pottery types in Wisconsin are "comprehensive" types, which subsume a wide range of attribute variability within them. For example, Grand River Plain is a regional name for plain, globular, shell-tempered pottery vessels with constricted necks and moderately out-flaring rims. Small-scale spatial and temporal variability are disguised by the use of the "comprehensive" type designation, although this designation itself has significance as an indicator of general culture and time period in eastern Wisconsin.

1. SAMPLE. Shell-tempered Oneota ceramics predominate at the site. A relatively small number of grit-tempered Woodland and Langford sherds indicate the existence of several additional components at the site, although some of the Langford Ware is probably part of the Grand River component. All grit-tempered sherds are discussed separately as a unit, because it is difficult to assign most of them to specific components.

The actual number of vessels represented in the sample is difficult to determine. However, minimum numbers of the several vessel categories include approximately 253 large shell-tempered jars, 57 miniature shell-tempered jars, 3 miniature shell-tempered bowls, and 37 grit-tempered jars. In the following discussion "vessel" is restricted to large sherds with both a rim and shoulder attached, that can be assigned to a "type." The ceramic analysis is based on the following sample:

	shell-tempered		grit-tempere	
	in situ	surface	in situ	surf
undecorated bodysherds	22,983	2622	758	39
decorated bodysherds	188	11	21	(
rimsherds	187	8	31	1
handles	10	0	0	(
'vessels'	129	1	0	(
sherd totals	24,111	2684	810	4(

2. LARGE SHELL-TEMPERED JARS. Large jars are basically homogeneous in paste, surface finish, and vessel shape; consequently, these attributes are discussed together. Provenience and attribute combinations are tabulated by classes in Table 39 for vessels, in Table 54 for unattached lip and rim sherds, in Table 53 for decorated shoulder sherds, and in Table 55 for plain sherds and sherd weights.

a) PASTE. Temper particles range from powdery to large chunks up to 10 mm. in length. Most sherds have a "moderate" to "abundant" amount of temper, few pieces of which actually exceed 3 mm. in length. Every large sherd examined also contained spherical iron oxide particles ranging in size from minute to 3 mm. in diameter. A single sherd with baked clay and shell for temper came from F27-L1. A second sherd with crushed pieces of bone mixed with shell as tempering materials came from the house floor of U62. The consistency of sherds ranges from flaky to a more moderately compact structure; most of the shell is aligned parallel to the vessel surface.

Exterior and interior colors were compared to six general categories in an inter-site comparison; one of these colors (orange) does not appear in the Walker-Hooper site sample. Approximately two-thirds of the vessels have the same color on both surfaces. Table 39 records the association of color categories with vessel types. Table 17 below lists the percentages of these general color categories in the sample.

	1	2	3	5	6	
	yellowish-brown	brown	reddish-brown	gray	black	
exterior	25	39	14	5	17	100%
interior	28	34	14	6	18	100%

Table 17. Percentages of surface colors on large shell-tempered jars

b) SURFACE FINISH. The surfaces of all but a few sherds are smooth and dull. Two vessels and a bodysherd have grooved-paddle stamped or thong wrapped paddle stamped surfaces. The entire body of a vessel from F45-L1 was marked in this manner, while the shoulder immediately below the neck was paddled on a vessel from U2-L1 (Plate 1, G). The stamped sherd came from F45-L1. Three sherds have cord-wrapped paddling on their exterior

maximum thickness in mm.	percent (%)
1.5 to 2.5	1.0
2.6 to 3.5	13.0
3.6 to 4.5	16.0
4.6 to 5.5	27.0
5.6 to 6.5	23.0
6.6 to 7.5	10.0
7.6 to 8.5	6.0
8.6 to 9.5	1.5
9.6 to 10.5	2.0
10.6 to 11.5	0.5

Table 18. Sample of bodysherd thickness

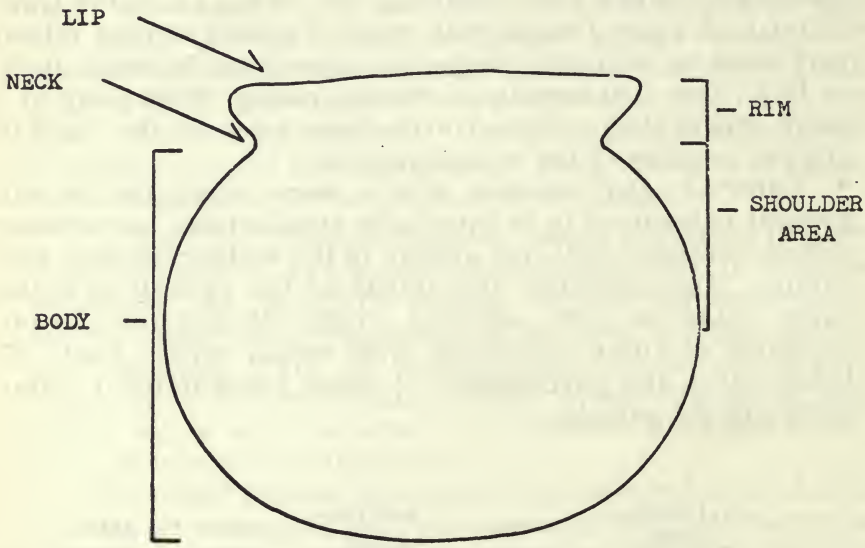


Figure 7. Pottery vessel terminology

surface; their provenience is F48-L2, F47-L1, and F61-NV. Nearly all vessels exhibit scraping or smoothing in the form of many parallel striations, especially on the neck, rim, and vessel interior. A slight burnish occurs on a few sherds, probably the result of handling.

c) SURFACE RESIDUES. Few sherds exhibit food encrustation or other residues on their surfaces. Food encrustations appear on only four vessels (Table 39), while fourteen plain bodysherds have a red film on their interior surface (F6-NV; F32-L2, 4 sherds; F37-L2; F37-L4; F45-L3, 5 sherds; F50-L1; U24-L1). A sherd from U7-L1 has

a blistered gray residue on the inner surface.

d) VESSEL FORM. A globular vessel with a rounded base and rounded shoulders is the only type of large jar in the sample (Figure 7). Some squat vessels have a sub-angular shoulder. The thickest areas of the average vessel are on the neck and the base. A sample of a few hundred bodysherds was measured for mean thickness (Table 18).

e) ATTRIBUTE CLASSES. Most of the attributes selected for study are non-continuous variables, such as location and kind of decoration. Several continuous variables, e.g. rim heights and various widths of trailed lines, have also been included, because they appear to have some significance within and between phases of the tradition.

The attribute classes selected for discussion within this study and their elements are:

Class I: Lip Profile

1. rounded
2. flattened
3. everted
4. inward bevel
5. outward bevel
6. exterior roll
7. thickened
8. flat, thickened, and everted

Class II: Lip Decoration Technique

1. narrow tool-impression
2. fingertip punctate
3. reed punctate
4. miscellaneous punctate
5. long ellipse
6. node
7. finger or broad tool-impression

Class III: Lip Design Elements

7 basic designs, illustrated in Figure 8

Class IV: Rim Profile

9 basic profiles, illustrated in Figures 11-14

Class V: Rim Cross Section

1. even thickness
2. thinning to lip
3. expanding to lip

Class VI: Rim Height

1. 1 to 9 mm.
2. 10 to 19 mm.
3. 20 to 29 mm.
4. 30 to 39 mm.
5. 40 to 49 mm.
6. 50 to 59 mm.
7. 60 to 69 mm.

Class VII: Inner Rim Design Technique
finger or broad tool-impression

Class VIII: Inner Rim Design Elements
1 basic design, element 3 in Figure 8, RIM

Class IX: Lip Exterior Design Technique
1. elliptical tool-impression
2. ovoid fingertip impression
3. finger or broad tool-impression
4. circular punctation made by a blunt ended tool

Class X: Lip Exterior Design Elements
3 basic designs, illustrated in Figure 8, RIM

Class XI: Angle of Rim to Body
1. outslant
2. straight
3. inslant

Class XII: Neck Configuration
1. curved
2. angular

Class XIII: Shoulder Decoration Technique
1. trailed, tool
2. trailed, tool and tool-impressed
3. trailed, tool and punctate, blunt
4. finger-trailed
5. finger-trailed and tool-impressed
6. trailed, tool and reed punctate
7. incised
8. reed punctate
9. tool-impressed
10. punctate made by round blunt ended tool
11. reed trailed
12. reed trailed and punctate
13. "half-moon" punctate
14. fingernail punctate
15. punctate - a small ovoid made by a sharp ended stick
16. punctate - a large intaglio (15-20 mm. in diameter)

Class XIV: Width of Trailed Lines in Class XIII
1. narrow (0.1 to 2.5 mm)
2. medium (2.6 to 4.5 mm.)
3. wide (4.6 to 8.0 mm.)
4. very wide (more than 8.0 mm.)

Class XV: Shoulder Design
1. rectilinear only
2. curvilinear only
3. both 1 and 2
4. tool-impressed, punctated, or dashes only
5. both 1 and 4
6. both 2 and 4

Class XVI: Shoulder Design Elements
18 basic designs, illustrated in Figure 10

Class XVII: Location of Decoration
1. shoulder
2. lip
3. shoulder and lip
4. shoulder and lip exterior
5. lip exterior

Class XVIII: Appendages
1. detached equilateral strap handle
2. detached loop handle
3. loop handle riveted to rim below lip
4. lug

Class XIX: Handle Decoration Technique
1. plain
2. single groove down the center

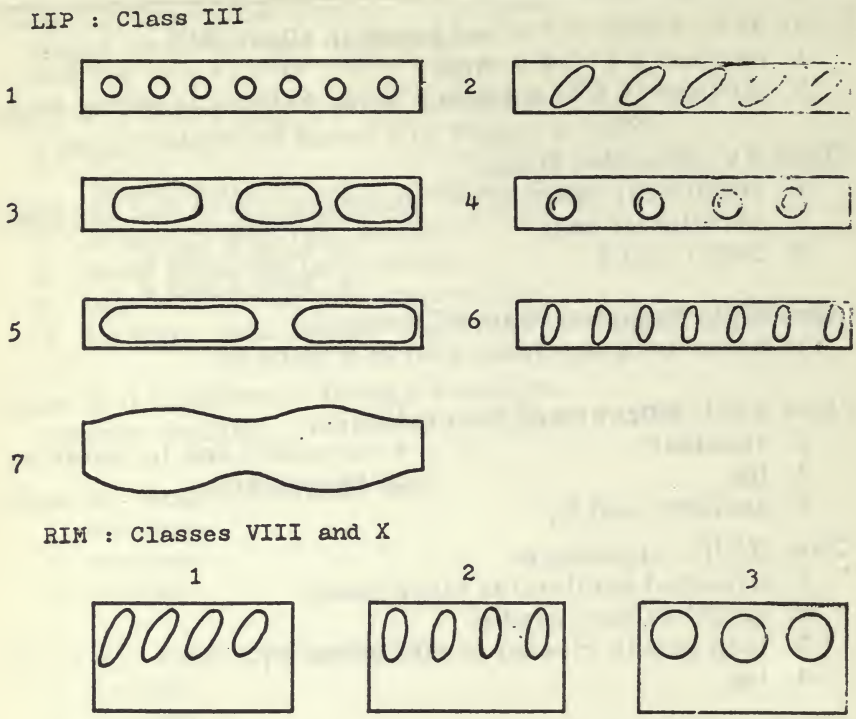


Figure 8. Lip and rim design elements for the Walker-Hooper site Grand River phase component

CLASS I: LIP PROFILE. Lips of vessels and of unattached lips and rimsherds are of eight different configurations (Figure 9). The numbers in Figure 9 correspond to the lip profile elements listed below in Table 19.

	unattached lips - rims		vessels		site total		thickness (mm.)	
	no.	%	no.	%	no.	%	range	mean
1. rounded	443	66.7	54	59.3	497	65.8	2 - 9	4.8
2. flattened	131	19.7	20	22.0	151	20.0	3 -10	5.1
3. everted	16	2.4	1	1.1	17	2.2	2 - 8	5.9
4. inward bevel	36	5.4	13	14.3	49	6.5	3 - 9	5.3
5. outward bevel	12	1.8	1	1.1	13	1.7	3 - 7	5.2
6. exterior roll	1	0.2	1	1.1	2	0.3	6	6.0
7. thickened	24	3.6	1	1.1	25	3.3	5 -11	7.8
8. flat, everted, and thickened	1	0.2	0	0	1	0.1	10	10.0
total	664	100.0	91	100.0	775	99.9		

Table 19. Lip profile attributes

CLASS II: LIP DECORATION TECHNIQUE. The lips on large shell-tempered jars were decorated by variations of several techniques. A brief explanation of each variation as it appears on the lip is given below.

1. NARROW TOOL-IMPRESSION (Plate 1, B). A tool impression is formed by placing a tool on a still maleable vessel surface and pressing downward at an angle to the surface. Narrow tool-impressions on lips in the sample are always elliptical and seldom exceed 3 mm. in depth. Impression width is usually 4-7 mm., although the range is 1-10 mm.

2. FINGERTIP PUNCTATE (Plate 1, D). In this report a punctate is defined as an impression produced by pushing an object vertically into a still maleable vessel surface. Fingertip punctates are shallow ovoids with a fingernail imprint in the depression. The punctates are usually 5-7 mm. in width, with a range of 3-8 mm. On smaller lips only the fingernail imprint is visible.

3. REED PUNCTATE (Plate 1, A). Small, round punctates made with a hollow tube, probably a reed or bird bone. These punctates are generally 2-3 mm. in diameter and 1-5 mm. in depth.

4. MISCELLANEOUS PUNCTATE (Plate 1, E). A number of punctates were made by a solid stick of varying diameter and configuration. Most are round with blunt ends. Punctations of this kind have a diameter between 3-5 mm., except for one lip with punctates 1.5 mm. in diameter. Two lips have rectangular punctations 2 mm. in length.

5. LONG ELLIPSE (Plate 1, G). Impressions formed by a very broad tool or by two fingers. Subsequent smoothing may obliterate the individual finger impressions. Impression length ranges from 20-40 mm., with most between 25-35 mm.

6. NODE (Plate 1, F). A distinct thickening or swelling of the lip is referred to as a node.

7. FINGER OR BROAD TOOL-IMPRESSION (Plate 1, C). Essentially the same as 5 above, except the impressions were made by a single finger or narrower tool. Impression

length ranges between 9-17 mm., with most between 10-14 mm.

technique	unattached lips		unattached rims		vessels		site total	
	no.	%	no.	%	no.	%	no.	%
1	48	9.5	19	11.9	11	12.0	78	10.3
2	20	3.9	10	6.2	5	5.4	35	4.6
3	1	0.2	1	0.6	0	0	2	0.3
4	4	0.8	3	1.9	2	2.2	9	1.2
5	5	1.0	3	1.9	5	5.4	13	1.7
6	0	0	0	0	1	1.1	1	0.1
7	53	10.4	11	6.9	4	4.3	68	9.0
plain	376	74.2	113	70.6	64	69.6	553	72.8
total	507	100.0	160	100.0	92	100.0	759	100.0

Table 20. Lip decoration technique

CLASS III: LIP DESIGN ELEMENTS. There are seven basic patterns of lip design (Figure 8). Each pattern consists of a single decoration technique more or less evenly spaced along the lip. A brief description of each pattern is given below. Table 21 contains frequencies and percentages.

1. consecutive reed or blunt stick punctations 2-10 mm. apart (Plate 1, A and E)
2. consecutive oblique narrow tool-impressions, that cross the lip at an approximate 45° angle 3-8 mm. apart (Plate 1, B)
3. consecutive fingertip or broad tool-impressions 3-30 mm. apart (Plate 1, C)
4. consecutive fingertip punctates 2-30 mm. apart (Plate 1, D)
5. consecutive long ellipses 5-35 mm. apart (Plate 1, G)
6. consecutive transverse narrow tool-impressions 3-8 mm. apart
7. nodes at least 45 mm. apart (Plate 1, F).

CLASS IV: RIM PROFILE. Rims are of nine basic configurations (Figures 11-14). Profiles 1, 2 and 6 are characterized by a gently out-curving rim 5° to 45° from a vertical line drawn through the neck. These three profiles are differentiated by arbitrary rim height limits (1 - greater than 35 mm., 2 - 20 to 35 mm., 6 - less than 20 mm.). Table

22 contains the frequency and percentage distribution of rim profiles.

Table 21. Frequency and percent of lip design elements

design	unattached lips no.	unattached lips %	unattached rims no.	unattached rims %	vessels no.	vessels %	site total no.	site total %
1	5	1.0	4	2.5	2	2.2	11	1.5
2	2	0.4	2	1.2	2	2.2	6	0.8
3	53	10.4	11	6.9	4	4.3	68	9.0
4	20	3.9	10	6.2	5	5.4	35	4.6
5	5	1.0	3	1.9	5	5.4	13	1.7
6	46	9.1	17	10.6	9	9.8	72	9.5
7	0	0	0	0	1	1.1	1	0.1
plain	376	74.2	113	70.6	64	69.6	553	72.8
total	507	100.0	160	100.0	92	100.0	759	100.0

Table 22. Frequency and percent of rim profiles

profile	unattached rims no.	unattached rims %	vessels no.	vessels %	site total no.	site total %
1	80	50.0	39	42.4	119	47.2
2	45	28.1	34	36.9	79	31.3
3	1	0.6	1	1.1	2	0.8
4	0	0	1	1.1	1	0.4
5	3	1.9	5	5.4	8	3.2
6	29	18.1	8	8.7	37	14.7
7	2	1.3	1	1.1	3	1.2
8	0	0	2	2.2	2	0.8
9	0	0	1	1.1	1	0.4
total	160	100.0	92	100.0	252	100.0

CLASS V: RIM CROSS SECTION. Rim cross sections are either of even thickness from neck to lip (1), thinning (2), or expanding (3).

Table 23. Frequency and percent of rim cross sections

cross section	unattached rims no.	unattached rims %	vessels no.	vessels %	site total no.	site total %
1. even	35	24.6	21	22.8	56	23.9
2. thinning	63	44.4	46	50.0	109	46.6
3. expanding	44	31.0	25	27.2	69	29.5
total	142	100.0	92	100.0	234	100.0

CLASS VI: RIM HEIGHT. Rim heights have been grouped into seven 10 mm. categories. The actual height of individual rims is recorded in Tables 39 and 54.

Table 24. Frequency and percent of rim heights

height in mm.	unattached rims no.	unattached rims %	vessels no.	vessels %	site total no.	site total %
1. 1 to 9	3	1.9	2	2.2	5	2.0
2. 10 to 19	27	17.0	11	12.0	38	15.1
3. 20 to 29	41	25.8	28	30.4	69	27.5
4. 30 to 39	28	17.6	21	22.8	49	19.5
5. 40 to 49	53	33.3	20	21.7	73	29.1
6. 50 to 59	6	3.8	8	8.7	14	5.6
7. 60 to 69	1	0.6	2	2.2	3	1.2
total	159	100.0	92	100.0	251	100.0

CLASS VII AND VIII: INNER RIM DESIGN TECHNIQUE AND ELEMENTS. Four lip fragments are decorated on the upper edge of the inner rim. The technique used on all four lips is an impressed finger or broad tool. Impressions are 14-20 mm. in maximum diameter and ovoid in outline. The basic decorative design is a single row of impressions 5-15 mm. apart circling the upper edge of the inner rim (Figure 8, B3). The provenience of these sherds is recorded in Table 54.

CLASS IX AND X: LIP EXTERIOR DESIGN TECHNIQUES AND ELEMENTS. Lip exteriors are decorated by four basic techniques, each producing a different decorative element: 1) elliptical tool-impressions 4-7 mm. wide (Plate 2, A), 2) ovoid fingertip impressions (Plate 2, B), 3) finger or broad tool-impressions 5-13 mm. wide (Plate 2, D and E), and 4) circular punctations made by a blunt-ended instrument (Plate 2, C).

The design elements of attributes 2-4 are all consecutive ovoid impressions 2-10 mm. apart (Figure 8, B). Patterns on rims with elliptical tool-impressions are of two kinds: 1) consecutive long, oblique tool-impressions 5-10 mm. apart, and 2) consecutive vertical tool-impressions 2-10 mm. apart. Except for one unattached rim and one unattached lip fragment, patterns of elliptical impressions are of the latter kind.

CLASS XI: ANGLE OF RIM TO BODY. The angle of the rim on vessels either slants outward (89 vessels), is vertical (2 vessels), or slants inward (1 vessel). The angle is taken from a vertical line drawn through the perimeter of the vessel orifice. Angular divergence ranges from 5° to

45° for out-slanting rims and measures 5° for the single inslanting rim. The most common out-slanting angle is c. 30°.

CLASS XII: NECK CONFIGURATION. Vessels and bodysherds with necks attached have either curved (1) rim-shoulder junctures or angular (2). Only 1.9% of the necks in the sample have an angular juncture. Table 55 contains the provenience and frequency of bodysherds with round necks. Rim profiles in Figures 11 and 12 are examples of curved junctures, while profiles 3 and 4 in Figure 13 are angular. Plain neck sherds with an angular juncture came from F70-L2, F74-L4, and U29-L1. Rimsherds with angular necks came from F6-L2, F26-L1, and F48-L3.

CLASS XIII: SHOULDER DECORATION TECHNIQUE. Only 0.8% of the bodysherds and 5.4% of the vessel shoulders are decorated. Table 53 lists the distribution and frequency of occurrence of decorated bodysherds. Ten techniques or combinations of techniques were used to decorate sherds and the shoulders of vessels in this sample of large shell-tempered jars. These techniques are seen on the vessel or sherd as:

1. trailing made by a smooth-ended tool (Plate 3, A and B)
2. trailing (smooth-ended tool) and tool-impressions (Plate 3, C)
3. trailing (smooth-ended tool) and blunt-ended punctates (Plate 6, E)
4. finger-trailing (Plate 6, right in A)
6. trailing (smooth-ended tool) and reed punctates (Plate 3, D)
7. incised lines (Plate 6, H)
8. reed punctates (Plate 6, G)
10. round blunt-ended punctates (Plate 4, D)
11. trailing by a tool with a jagged end (Plate 6, left two sherds in D)
12. trailing by a tool with a jagged end ("reed" trailing) and punctates (Plate 4, left sherd in A).

The frequency of occurrence of shoulder decoration techniques is listed in Table 26.

Table 25. Frequency and percent of lip exterior design techniques

technique	unattached lips		unattached rims		vessels		site total	
	no.	%	no.	%	no.	%	no.	%
1	7	1.4	3	1.9	3	3.3	13	1.7
2	1	0.2	0	0	0	0	1	0.1
3	8	1.6	4	2.5	0	0	12	1.6
4	1	0.2	0	0	0	0	1	0.1
plain	490	96.6	153	95.6	89	96.7	732	96.5
total	570	100.0	160	100.0	92	100.0	759	100.0

Table 26. Frequency of shoulder decoration techniques

shoulder decoration technique	bodysherds and small shoulder fragments on rimsherds	vessels
1. trailed, smooth tool	126	3
2. trailed, smooth tool and tool-impressed	1	1
3. trailed, smooth tool and blunt punctate	4	0
4. finger-trailed	5	0
6. trailed, smooth tool and reed punctate	1	0
7. incised	3	0
8. reed punctate	9	0
10. round blunt-ended punctate	11	0
11. reed trailed (jagged end)	17	0
12. reed trailed and punctates	0	1
plain	21,676	87

CLASS XIV: WIDTH OF TRAILED LINES. Trailed lines were separated into four width categories following suggestions of Wedel (1959) and Henning (1961).

CLASS XV: SHOULDER DESIGN. Vessels and decorated bodysherds were separated into groups, depending on the kinds of designs displayed: rectilinear, curvilinear, punctates or tool-impressions. Attribute combinations for individual sherds and vessels are recorded in Tables 39 and 53.

Table 27. Frequency of categories of trailed line widths

width category in mm.	sherds		vessels	
	no.	%	no.	%
1. narrow (0.1 to 2.5)	48	35.8	2	40.0
2. medium (2.6 to 4.5)	63	46.9	2	40.0
3. wide (4.6 to 8.0)	15	11.2	1	20.0
4. very wide (more than 8.0)	8	6.1	0	0
total	134	100.0	5	100.0

Table 28. Frequency and percent of shoulder designs

shoulder designs	sherds no.	sherds %	vessels no.	vessels %
1. rectilinear	110	72 9	1	20.0
2. curvilinear	16	10.6	1	20.0
3. both 1 and 2	2	1.3	1	20.0
4. tool-impressions or punctates	17	11.3	0	0
5. both 1 and 4	6	3.9	1	20.0
6. both 2 and 4	0	0	1	20.0
total	151	100.0	5	100.0

CLASS XVI: SHOULDER DESIGN ELEMENTS. Eleven basic design elements were reconstructed from larger bodysherds and from vessels (Figure 10, 1-11). A study of the sample suggests that each element is one section of a pattern of identical elements forming a continuous band of decoration around the vessel shoulder. The eleven elements are also illustrated in Plates 3 (1A, 2B, 3C, 4D), 4 (5A, 6B, 7C, 9D, 10E), and 5 (11).

Most of the bodysherds are too small to include a complete design element. These sherds were separated into twelve sherd design element groupings. Attribute combinations of these sherds and their proveniences are recorded in Table 53.

1. single straight trailed-line
2. two or more parallel straight trailed-lines
3. two or more intersecting trailed-lines in a chevron pattern (Plate 6, A and C)
4. criss-crossing straight trailed-lines
5. single curvilinear trailed-line
6. two or more curvilinear trailed-lines (Plate 6, B)
7. one straight and one curvilinear trailed-line
8. one diagonal trailed-line with attached vertical trailed lines (Plate 6, D)
9. trailed-line with bordering punctates or tool-impressions (Plate 6, E)
10. two or more punctates or tool-impressions (Plate 6, G)
11. illustrated sherd with incised criss-cross pattern (Plate 6, H)
12. illustrated sherd with trailed curvilinear pattern (Plate 6, F).

The frequency and percent of shoulder design elements are listed in Table 29.

Table 29. Frequency and percent of shoulder design elements

shoulder design elements	bodysherds no.	bodysherds %	vessels no.	vessels %	fragmented sherd design elements	bodysherds no.	bodysherds %
1	16	44.4	1	20.0	1	55	41.3
2	13	36.0	0	0	2	27	20.1
3	1	2.8	0	0	3	12	9.0
4	1	2.8	0	0	4	3	2.3
5	2	5.6	1	20.0	5	7	5.3
6	1	2.8	1	20.0	6	7	5.3
7	1	2.8	0	0	7	2	1.5
8	1	2.8	0	0	8	1	0.8
9	2	5.6	0	0	9	2	1.5
10	0	0	1	20.0	10	15	11.3
11	0	0	1	20.0	11	1	0.8
	36	100.0	5	100.0	12	1	0.8
						133	100.0

CLASS XVII: LOCATION OF DECORATION. Thirty three vessels or 37 percent of the vessel sample exhibit some decoration. The location of the decoration on these vessels is either on the shoulder, lip, lip exterior, or a combination of these areas.

Table 30. Location of decoration on vessels

	1 shoulder	2 lip	3 shoulder and lip	4 shoulder and lip exterior	5 lip exterior	plain vessels
number	3	27	1	1	2	58.0
percent	3.3	29.3	1.1	1.1	2.2	63.0

CLASS XVIII: APPENDAGES. Appendages on jars consist of equilateral strap handles, loop handles, and perhaps, lugs. Table 31 lists the provenience, type, and dimensions of handles. A plain lug was recovered from U48-L1 (Plate 11, D). All of the handles are detached from vessels, except for a loop handle riveted to an unattached rim in F3-L1. Four of the handles are plain (nos. 3, 7, 9 and 10 in Table 31), two have a groove running the length of the handle (nos. 2 and 4; left handle in Plate 11, F), and four are too fragmentary to discern the presence or absence of decoration (nos. 1, 5, 6, 8). Examples of strap and loop handles are illustrated in Plate 11 (E and F). The second loop handle from the left in E (Plate 11) demonstrates how these handles were molded to the lip. The appendages have been placed in four categories: 1) detached equilateral strap

handle; 2) detached loop handle; 3) loop handle riveted to the rim below the lip; 4) lug.

A method of suspension probably as common as the use of handles was suspension by thongs passed through holes 3-5 mm. in diameter drilled from the exterior in the upper shoulder area. Thirteen sherds were found with holes of this kind (Tables 54 and 55).

Table 31. Provenience, type and dimensions of handles on large jars

no.	unit/ feature	level/ house	type	thickness	dimensions in mm. width	length	diameter
1	F 3	1	3	-	-	-	-
2	F14	NV	1	9	13	(42)	-
3	F37	2	1	10	16	(44)	-
4	F45	1	1	12	19	-	-
5	F45	2	1	12	17	-	-
6	F48	4	1	18	25	(32)	-
7	58	H-2	1	-	20	-	-
8	27	1	1	-	-	-	-
9	48	1	2	-	-	39	11
10	49	1	2	-	-	-	9

() indicates approximate value only

f) TYPES AND PATTERNS. The ninety-four large, globular, shell-tempered jars that are complete enough to treat as vessels can be assigned with one exception to pottery types proposed by Robert Hall (1962). These types are Carcajou Curvilinear, Carcajou Plain, Grand River Trailed, Grand River Plain, and Busseyville Grooved Paddle. Vessels of the type Carcajou Curvilinear are decorated with a prevalence of curvilinear designs on their shoulders and notching on their upper or outer lip (ibid:60-63). Grand River Trailed vessels lack lip notching and frequently have only rectilinear elements on their shoulders (ibid:65-68). The two types Carcajou Plain and Grand River Plain lack decoration, as their names suggest, except for the definitive presence of lip notching on vessels of the former type (ibid:63-65, 68-70). Busseyville Grooved Paddle vessels are characterized by the presence of narrow, parallel grooves on their exterior surface, presumably the effect of a grooved paddle used in shaping the vessels (ibid:70-72). The single vessel that is unclassified has lip notching and an incised chevron pattern on the shoulder (Plate 4, E). Table 39 contains the attribute combinations and proveniences of vessels of the above types. Numbers in the TYPE column in Table 39 refer to those associated with the types in the

chart below. The frequencies by type of these vessels, all of which were found in situ, are:

	1	2	3	4	5
	Carcajou Curvilinear	Carcajou Plain	Grand R. Trailed	Grand R. Plain	Busseyville Grooved Paddle
no.	1	28	3	59	2
%	1.1	29.7	3.2	62.7	2.2

These types are "comprehensive" types subsuming a wide range of attribute variability within them. The variability of attribute associations can be illustrated by the use of two tests of association, the Pearson product-moment coefficient of correlation and the analysis of covariance (Tables 32 and 33). These tests are intended here to seek clusters of related properties (i.e. an r-type analysis). Universal attributes such as temper and body shape have been excluded from the analyses (i.e. attributes that are universally present in all vessels) and only associative attributes used. Associative attributes appear on only some, but not on all of them; they must have zero or nonpresent values. Some but not all associative attributes are also relational or linked attributes. These are attributes whose presence can be easily predicted from the presence of one or more other attributes linked with it by a shared definitive element. An example is the linkage between attribute 2 of Class II (fingertip punctate) and attribute 4 of Class III (consecutive fingertip punctates). Clustering of relational attributes, then, is not as informative as that between non-relational attributes.

Attribute coherence within the sample is very loose as indicated by the large number of small scale associations. Furthermore, there seems to be little justification for defining types in this sample on the basis of the correlation of rim and shoulder decoration or its absence, for the rim and shoulder complexes seem strikingly independent in all but a few patterns. Particular lip or rim profiles and rim cross sections seem to correlate more frequently with shoulder decorations or their absence than does the presence or absence of lip-rim decoration. However, the sample is relatively small (N is 106 for vessels and 171 for rims) and the patterns should be considered suggestive until a larger sample can be studied. Vessels and rims from the Bornick site have been used to augment the Walker-Hooper

site sample in both tests of association. The patterns established using the Pearson product-moment coefficient of correlation and the analysis of covariance were so similar, that a composite of these two analyses was used in constructing Tables 32 and 33.

Although these tests have not been exhaustive, they are sufficient to demonstrate the absence of well-defined associations between many attributes and between these and the named vessel types. While broad types are convenient as indicators of period or general cultural tradition, the temporal and spatial analyses of individual attribute patterns should be more informative within these periods or traditions. It is not clear of course just how many of these patterns are direct reflections of significant patterns of human behavior. Similar analyses on more inclusive or related samples should help resolve this question.

g) MISCELLANEOUS CLAY OBJECTS.

FABRIC IMPRESSED SHERD. A single sherd from the house floor in U61 has a s^{z}_{z} twist fabric impression on the outer surface.

PAINTED SHERDS. Three sherds have a red-tan-yellow pattern of negative painting on their exterior surfaces (Plate 10, B). The proveniences of these small sherds are F32-L2, F50-L1, and U38-L1. Two sherds from F6-L3 exhibit localized black paint applied by a positive painting technique (Plate 10, B). At least five other vessels have a black wash on the rim exterior and/or upper shoulder area (Plate 8, D). The distribution of rims with a black wash is listed in Table 54. A muskrat tooth was apparently used to grind the solution, for a similar black residue covers the lower half of a tooth from H83.

PATCHES. Small pottery patches were applied to at least two vessels in an attempt to seal a break before firing. A rimsherd from U50-L1 shows a patch in place (Plate 11, A) and a rimsherd from U67-L1 shows a crack and the molded interior of the removed patch (Plate 11. B). The color and texture of the rims and patches are similar.

3. MINIATURE VESSELS. There are two categories of miniature vessels. The first consists of crudely modeled pots briefly baked at a relatively high temperature in a clean burning fire (Plate 7; Figure 15). Temper is either absent

Table 32. Patterns of Attribute Associations for Large Shell-Tempered Jars from the Walker-Hooper and Bornick Sites *

A. 16-0

1. 1-2 9-0" 10-0" 13-0' 14-0' 15-0' 16-0' 17-0
2. 4-1 6-1 13-0' 14-0' 15-0' 16-0' 22-0
3. 4-1 6-1 12-1 13-0' 14-0' 15-0' 16-0' 21-3
4. 5-2 13-0' 14-0' 15-0' 16-0' 17-0
5. 5-2 13-0' 14-0' 15-0' 16-0' 21-3
6. 6-1 13-0' 14-0' 15-0' 16-0' 17-2 22-0
7. 9-0" 10-0" 13-0' 14-0' 15-0' 16-0' 17-2

B. 16-1

1. 4-2 13-1' 14-2' 15-3' 16-1' 17-1'
2. 5-3 13-1' 14-2' 15-3' 16-1' 17-1'
3. 14-2' 15-3' 16-1' 17-1' 20-2
4. 16-1' 17-1' 20-2 21-2

C. 16-5

1. 1-4 4-5' 12-2' 13-12' 14-3' 15-5 16-5' 17-1'
2. 4-5' 5-2 12-2' 13-12' 14-3' 15-5 16-5'
3. 13-12' 14-3' 15-5 16-5' 17-1' 20-2
4. 14-3' 15-5 16-5' 17-1' 20-2 21-2

D. 16-6

1. 4-2 13-1' 14-1' 15-2' 16-6' 17-4'
2. 5-1 14-1' 15-2' 16-6' 17-4' 20-1 21-1
3. 9-1' 10-2' 13-1' 14-1' 15-2' 16-6' 17-4' 20-1
4. 13-1' 14-1' 15-2' 16-6' 17-4' 20-1 21-1

E. 16-10

1. 1-3' 2-1 3-6 13-1' 14-1' 15-1' 16-10' 17-3'
2. 1-3' 4-2 13-1' 14-1' 15-1' 16-10' 17-3'
3. 1-3' 5-3 13-1' 15-1' 16-10' 17-3' 20-1 21-1
4. 1-3' 13-1' 14-1' 15-1' 16-10' 17-3' 20-1 21-1

F. 16-11

1. 4-2 13-1' 14-2' 15-3' 16-11' 17-1'
2. 5-3 13-1' 14-2' 15-3' 16-11' 17-1'
3. 13-1' 14-2' 15-3' 16-11' 17-1' 22-1
4. 14-2' 15-3' 16-11' 17-1' 20-2 22-1
5. 14-2' 15-3' 16-11' 21-6

G. Miscellaneous

1. 1-1 4-2 14-2' 15-3'
2. 1-1 14-2' 15-3' 20-2
3. 2-0" 3-0" 14-2' 15-3' 17-1' 20-2
4. 2-1 5-1 14-1
5. 9-1' 10-2' 17-5'
6. 11-3' 20-5' 21-5
7. 12-1 20-1

* numbers represent classes and their associated attributes
20 - exterior surface color
21 - interior surface color
22 - food encrustations (0 = absent, 1 = present)

' " attributes clustering within their pattern at the 5 percent level of significance; all others cluster between the 33 and 5 percent levels of significance

Table 33. Patterns of Attribute Associations on Shell-Tempered Rims from the Walker-Hooper and Bornick Sites +

1. 1-1 2-1' 3-2'*
2. 1-1 2-1' 3-6' 4-6*
3. 1-1 2-1' 3-6' 17-2
4. 1-1 2-1 9-0*
5. 1-1 2-2 3-2*
6. 1-1 2-2' 3-4' 4-2
7. 1-1 2-2' 3-4' 17-2'
8. 1-1 2-2 4-6*
9. 1-1 2-7' 3-3' 4-2
10. 1-1 2-7' 3-3' 17-2'
11. 1-1 4-2 12-1
12. 1-1 6-1 12-1
13. 1-1 10-2*
14. 1-2 2-0' 3-0' 4-5 5-2*
15. 1-2 2-0' 3-0' 9-3 10-3*
16. 1-2 2-3 3-1*
17. 1-2 2-4' 3-1' 20-3
18. 1-2 2-5' 3-5' 21-2
19. 1-2 3-1 21-2
20. 1-2 4-6 17-0
21. 1-2 4-7 5-1
22. 1-2 4-8' 5-1 11-2'
23. 1-2 5-1 20-3
24. 1-2 17-0 20-5
25. 1-3 2-0' 3-0'*
26. 1-3 4-1' 6-1'*
27. 1-4 2-4' 3-1'
28. 1-4' 3-2 4-5'
29. 1-4 4-3' 12-2'
30. 1-4 4-4*
31. 1-4' 4-5' 5-2 12-2'
32. 1-4 9-1' 10-2' 17-5'
33. 1-4 10-1*
34. 1-5 4-1' 6-1'
35. 1-5 5-1
36. 1-5' 20-5'
37. 1-5 21-6
38. 1-6' 4-9' 5-3 20-1 21-1
39. 1-7 2-0' 3-0'*
40. 1-7 4-1' 6-1'
41. 1-7 4-7 5-1
42. 1-7 20-6 21-6
43. 1-8 4-1' 6-1'
44. 1-8 5-2*
45. 2-0' 3-0' 4-3 17-0'
46. 2-0' 3-0' 4-5*
47. 2-0' 3-0' 4-6 22-1
48. 2-0' 3-0' 4-6 17-0'
49. 2-0' 3-0' 9-1 10-2
50. 2-0' 3-0' 9-1 10-3*
51. 2-0' 3-0' 10-2 17-5
52. 2-0' 3-0' 17-0' 20-5
53. 2-0' 3-0' 17-1 20-2 22-1
54. 2-0' 3-0' 17-5 20-2
55. 2-1' 3-2' 5-1 17-2'
56. 2-1' 3-6' 10-0*
57. 2-1' 3-6' 17-2'
58. 2-1 9-0' 10-0'*
59. 2-2 3-1 4-6*
60. 2-2' 3-4' 4-2 5-1
61. 2-2' 3-4' 5-2 21-3
62. 2-2' 3-4' 17-2' 20-3
63. 2-2' 3-4' 17-2' 21-2
64. 2-2' 3-4' 20-3 21-3
65. 2-2 4-6 5-1*
66. 2-3 3-1 5-3*
67. 2-3 4-1 5-3*
68. 2-4' 3-1' 17-2 20-3
69. 2-4' 3-1' 20-1 21-1
70. 2-4' 3-1' 20-3 21-3
71. 2-4 4-2*
72. 2-5' 3-5' 4-1 6-1 21-2
73. 2-5' 3-5' 6-1 17-2' 21-2
74. 2-5' 3-5' 12-2
75. 2-5' 3-5' 17-2' 20-6
76. 2-6' 3-7' 4-1 5-3 20-1 21-1
77. 2-6' 3-7' 6-1 17-2
78. 2-7' 3-3' 4-1 6-1*
79. 2-7' 3-3' 4-8' 11-2' 20-6
80. 2-7' 3-3' 5-1 17-2' 20-3
81. 2-7' 3-3' 12-2
82. 2-7' 3-3' 17-2' 20-6
83. 2-7 4-8' 5-1 11-2'
84. 2-7 4-8' 11-2' 20-6
85. 3-2 4-5 21-6
86. 3-2 17-2 20-6
87. 3-2 20-6 21-6
88. 3-3 4-8' 5-1 11-2'
89. 3-3 4-8' 11-2' 20-6
90. 3-3 5-1 17-2 20-3
91. 3-3 12-2
92. 3-3' 17-2' 20-6
93. 4-1' 5-3 6-1' 9-3*
94. 4-1' 5-3 6-1' 12-1
95. 4-1 11-1 20-2 21-2
96. 4-1 17-5 20-2
97. 4-1 17-5 21-3
98. 4-2 11-3' 20-5'
99. 4-3' 5-2 12-2'
100. 4-3 5-2 17-0
101. 4-3 9-3 10-3*
102. 4-3 17-0 21-6
103. 4-3 20-6 21-6
104. 4-4' 5-2 12-2'
105. 4-4' 12-2' 21-1
106. 4-4 20-2
107. 4-5' 5-2 12-2' 20-5
108. 4-6 9-1 10-1*
109. 4-6 20-1
110. 4-7 20-6 21-6
111. 4-7 22-1
112. 4-8' 5-1 11-2' 20-1 21-1
113. 4-8' 11-2' 20-6 21-6
114. 5-1 10-3*
115. 5-2 9-0' 10-0'*
116. 5-2 11-3' 20-5'
117. 5-2 17-0 20-5
118. 5-3 6-1 9-3*
119. 5-3 12-1 20-1

\+ numbers represent classes and their associated attributes
20- exterior colors
21- interior colors
22- food encrustations (0=absent, 1= present)

* patterns associated with unattached rimsherds and not definable from the analysis of vessels alone

attributes clustering within their pattern at the 5 percent level of significance; all other attributes cluster between the 33 and 5 percent levels of significance

or more commonly consists of small amounts of finely ground shell; iron oxide particles are absent. All of the sherds and vessels in this category are soft, "chalky," and buff yellow in surface color. Sherd cross sections are usually gray, displaying the marked zoning indicative of an oxidizing atmosphere. Most of the vessels are no larger than the clenched fist and may represent children's attempts to make small vessels. The sample is composed of 27 vessels, 18 decorated shoulder sherds, 26 rimsherds, 139 lip fragments, and 608 plain bodysherds. The only interlocking scrolls (Figure 10, element 15; Plate 7, F) and single scroll (Figure 10, element 14; Plate 7, A) from the site occur on sherds of this category. Attribute associations and proveniences are recorded in Tables 35 (vessels), 36 (lips and rims), 37 (decorated shoulder sherds), and 55 (plain bodysherds). The classes and elements used in these tables are the same as those used for the large jars.

Ten jars and four bowls comprise the second category of miniature vessel (Plate 9; Figure 16). These vessels are shell-tempered and in general thinner, harder, better made, and more thoroughly fired than vessels in the first category. Five jars and three bowls are complete enough to treat as vessels (Table 39). The remaining five jars and one bowl are represented by fragments, which are described below.

The bowl is a base from level 1 of the overlap between F38 and F39 (Plate 9, B). Small, ovoid, sharp-ended stick punctates (Class XIII, element 13) decorate the base. Bodies of the five jars are undecorated. They represent 1) a bodysherd from U11-L1, 2) bases from F50-L1 and U2-L1, 3) a flat-lipped rim with transverse tool-impressions 1 mm. wide and 1-3 mm. apart from U27-L1, and 4) a cambered rim with a rounded lip from U27-L1 with the following average thicknesses: lip - 6 mm., rim - 3 mm., neck - 4 mm.

4. GRIT-TEMPERED POTTERY. A relatively small number of grit-tempered sherds representing more than one component were found at the Walker-Hooper site. Temper is a fine, crushed grit, rarely exceeding 1 mm. in diameter. Exterior colors range from light tan through reddish-brown shades to dark brown and gray. Core colors are usually the same as surface colors. All twist designations in the descriptions refer to the cord impression and not to the twist on the cord.

RIMSHERDS (sample 32)

a) SMOOTH SURFACED. Twelve rimsherds lacking cord-marking are too small to discern neck configuration or rim height. Provenience, measurements, and observable attributes are listed in Table 55. Two of these sherds are illustrated in Plate 8 (A and B). All twelve sherds probably belong within Langford Ware.

b) MADISON CORD IMPRESSED. Rim fragments from two vessels are large enough to display patterns of rim decoration. One vessel is represented by three sherds found in H62 (2 sherds) and in the overlap of F47 and F48. This rim is decorated with closely spaced, oblique, large Z, cord impressions (Plate 12, right rim in F). The round lip and interior surface are plain. Maximum thickness of rim and lip are 8 mm. and 5 mm. The rim is more than 40 mm. in height and curves slightly outward. A second vessel is represented by a single rimsherd from F37-L2 (Plate 12, left in F). Two horizontal small z cord impressions are located 22 mm. and 34 mm. below the flat lip. The upper edge of the rim interior is decorated with a slightly oblique S^{z}_{z} cord impression, running from the upper right to the lower left, extending 15 mm. below the lip. Maximum thicknesses of the rim and lip are 6.5 mm. Rim height is greater than 44 mm. The exterior surface of this rim is cord roughened; the lip and interior surface are plain.

c) MADISON PLAIN. Madison Plain is represented by rimsherds from seven vessels. This type is similar to Madison Cord Impressed except for the absence of exterior surface decoration. Cord impressions or punctates on the lip and/or rim interior are a minor decorative technique (Keslin 1958:225; Wittry 1959:197, 200). Four of the seven vessels have cord impressions on the lip, all but one have small s cord-marking on the exterior surface, and all have plain interiors.

1) F66-L2. Oblique (upper left to lower right) small s cord-wrapped stick imprints 3 mm. apart on lip beveled to the exterior; pseudo-collar 1 mm. thick extending 7 mm. below the lip; lip and rim thickness are 5 mm. and 6.5 mm. (Plate 12, second from right in A).
2) F67-L1. Same as above except: lip is gently rounded; slight swelling 8 mm. below the lip exterior, but no collar; lip and rim thickness are 5 mm.; rim height is

greater than 42 mm.; there is a slight S-twist to the rim profile (Plate 12, left rim in A).

3) F70-L1. Beveled lip slanting to the exterior; lip and rim thickness are 5 mm. (Plate 12, second from left in A).
4) F73-L3. Flat lip; oblique (upper left to lower right) small s cord-wrapped stick imprints 3 mm. apart on the lip; lip and rim thicknesses are 4 mm. and 5 mm.
5) F73-L3. Small z cord-marking on exterior surface; flat lip; oblique (upper right to lower left) small z cord impressions on upper edge of rim interior 2.5 mm. apart (the imprints extend 11 mm. down from the lip); lip and rim thicknesses are 3 mm. and 5 mm.
6) U16-L3. Flat to slightly rounded lip; interior exfoliate; lip thickness is 5 mm.
7) U80-L2. Flat lip; lip and rim thicknesses are 4 mm. and 5 mm. (Plate 12, right sherd in A).

d) POINT SAUBLE COLLARED. A single rimsherd of this type came from H76 (Plate 12, C). Small s cord impressions occur on the rim exterior, lip and upper edge of the rim interior. Small s cord-marking appears below the collar on the exterior surface. The vertical impressions on the collar and the rim interior are 5 mm. in length and 1-2 mm. apart. Cord impressions on the lip are oblique and extend 10-12 mm. in length. Collar and lip thicknesses are 10 mm. and 5.5 mm.

e) UNCLASSIFIED. Rimsherds from four vessels are unclassified as to type.

1) F37-L3, U44-L1, U78-L3 and 4. Four rimsherds of one vessel are decorated with vertical plain edge impressions on the upper rim exterior (Plate 12, E). The exterior surface is covered with cord-wrapped paddle impressions of indeterminable type; the interior surface is smooth. Rim and lip thickness are 5.5 mm. The lip is flat and obliterates some of the plain edge impressions, which are 19 mm. long, 3 mm. wide, and 2-3 mm. apart. Sherds of this vessel most closely resemble the type Leland Cord-Marked (Wittry 1959:207-209).
2) H84, U38-L1. Rimsherds of two vessels are too small to reveal more than a cord-wrapped stick impression on the lip. Small z impressions on one lip slant slightly

to the right on the lip exterior; lip and rim thickness are both 5 mm. Impressions appear to have been rolled over the lip from the upper edge of the rim interior on the second vessel (Plate 12, B). These impressions are a loosely knit large S. The thickness of the round lip is 7 mm. and the rim 8 mm.

3) U60-L1 and 2. Fragments of a unique vessel appear to be decorated by finger pinching or dragging on the exterior surface (Plate 12, D). The exterior surface is cord-marked, but the twist is not clear. Small s cord impressions cross the flat lip from the upper left to the lower right. Parallel narrow trailed lines 2-7 mm. apart and more than 27 mm. in length run across the rim interior from upper left to lower right. Lip and rim thickness are 12 mm. and 11 mm.

BODYSHERDS (sample 818)

a) PLAIN SURFACE (276 sherds). Cord-marking or other surface modification is absent; thickness ranges from 3-10 mm., with a mean of 5.2 mm.; frequencies of sherd thicknesses are tabulated in Table 34; proveniences are recorded in Table 55.

b) ERODED SURFACE (275 sherds). Surface modification destroyed; proveniences listed in Table 55.

c) CORD-MARKED SURFACE WITH SMALL Z IMPRESSIONS (37 sherds). Thickness ranges from 3-7 mm., with a mean of 5.4 mm.; frequencies of sherd thicknesses are tabulated in Table 34; proveniences are recorded in Table 55.

d) CORD-MARKED SURFACE WITH SMALL S IMPRESSIONS (124 sherds). Thickness ranges from 3-8 mm., with a mean of 5.6 mm.; frequencies of sherd thicknesses are tabulated in Table 34; proveniences are recorded in Table 55.

e) CORD-MARKED SURFACE WITH LARGE S IMPRESSIONS (4 sherds). Provenience and thickness: F68-L2 (4 mm.), U78-L1 (5.5 mm.), U78-L3 (4.5 mm.), surface (eroded interior).

f) CORD-MARKED SURFACE WITH LARGE Z IMPRESSIONS (2 sherds). Provenience and thickness: U40-L2 (6 mm.), surface (eroded interior).

g) SMOOTHED-OVER CORD-MARKED (74 sherds). Thickness ranges from 3-11 mm., with a mean of 5.3 mm.; frequencies of sherd thickness are tabulated in Table 34; proveniences are recorded in Table 55.

h) PLAIN ROCKER IMPRESSIONS ON SMOOTH SURFACE (7 sherds). Thickness ranges from 5-8 mm., with a mean of 6.3 mm. Proveniences are recorded in Table 38. (Plate 12, G).

i) INCISED LINES OVER CORD-MARKING (5 sherds). Lines are 2.5-3 mm. wide and cross small s cord-marking; provenience and descrip: F45-L1 (9.5 mm. thick; three parallel lines; Plate 12, right in H), U63-L1 (2 sherds 9.5 mm. thick, two parallel lines), U63-L2 (8.5 mm. thick; three parallel lines bordered by oblique dashes; Plate 12, left in H), U82-L1 (8 mm. thick; three parallel lines).

j) PSEUDO-CORD-MARKED SURFACE (4 sherds). Pseudo-cord-marking refers to the use of thongs or other non-interwoven fibers to wrap the paddle head. Sherd thicknesses are all 5 mm. Proveniences are listed in Table 38.

k) SMALL Z CORD IMPRESSIONS ON SMOOTH SURFACE (4 sherds). Thickness ranges from 4-4.5 mm. Proveniences are listed under category 1 in the cord impressed column in Table 38.

l) S^{Z}_{Z} CORD IMPRESSION ON SMOOTH SURFACE (2 sherds). Provenience and thickness are F70-L1 (6.5 mm.) and H62 (3 mm.). Sherds in this category are recorded as 2 under the cord impressed column in Table 38.

m) LARGE Z CORD IMPRESSION ON SMOOTH SURFACE (1 sherd). Sherd from U63-L1; thickness is 6 mm.

Table 34. Bodysherd thickness of grit-tempered pottery

maximum thickness in mm.	Plain		Cord-Marked					
			S^{Z}_{Z}		Z^{S}_{S}		smoothed-over	
	no.	%	no.	%	no.	%	no.	%
2.5 - 3.5	12	9.5	4	3.7	2	6.1	7	11.1
3.6 - 4.5	34	27.0	16	14.8	3	9.1	7	11.1
4.6 - 5.5	45	35.7	34	31.5	16	48.5	29	46.0
5.6 - 6.5	24	19.0	37	34.3	9	27.2	14	22.2
6.6 - 7.5	5	4.0	13	12.0	3	9.1	3	4.8
7.6 - 8.5	4	3.2	3	2.8	0	0	2	3.2
8.6 - 9.5	0	0	1	0.9	0	0	0	0
9.6 - 10.5	2	1.6	0	0	0	0	0	0
10.6 - 11.5	0	0	0	0	0	0	1	1.6
total	126	100.0	108	100.0	33	100.0	63	100.0

Listed as column 3 under cord impressed in Table 38.

n) cord-wrapped paddle edge or cord-wrapped cord stamp on smoothed-over cord-marked surface (1 sherd). The stamp consists of small s impressions (Plate 12, I). Provenience: F45-L1.

o) trailed lines 2-2.5 mm. wide on smoothed surface sherd from H56 (Plate 8, C).

E. Miscellaneous Artifacts

1. MISCELLANEOUS WORKED SHELL. Thirteen fragments of shell demonstrate smoothing and scoring. Their proveniences are: F6-NV, F27-NV, F32-L2, F37-L2, F37-L3, F38-L2, F45-L4, F47-L1, F59-L1, F69-L2, F70-L2, F71-L1, H78 (Plate 32, B).

2. PERFORATED DEER SCAPULAE (Plate 28, E). A deer scapula from F74-L5 has a small round hole one inch in diameter cut in the center of the blade. Some wear and abrasion occur around the neck, but the distal, cancellous edge of the blade is not worked. Pieces of three other scapulae that may have been cut in the same manner are from F46-L1, H58 and U34-L1.

3. BONE FRAGMENTS WITH EYES. Two flat, roughly parallel-sided tools from F58-L1 and F69-L1 are made from mammal bone and have an "eye" carved in one end. They may be fragments of mat needles (Plate 28, B).

4. DISC (Plate 19 E). A basalt disc 55 mm. in diameter and 17 mm. thick has bifacial crushing and battering around the entire circumference. The disc is a surface find.

5. WORKED BASALT. Three irregularly shaped fragments of basalt exhibit battering, crushing, striations and grinding along one edge. These stones are from F9-NV, F58-L4 and H62. Their maximum dimensions are 97 x 58 x 27 mm., 90 x 39 x 18 mm., and 82 x 39 x 16 mm.

6. LIMESTONE SLABS. Four flat limestone slabs are of uncertain function. A slab from F63-L3 has a white-gray residue on one flat surface. A large hoe-shaped slab from the plow zone has battering on one edge, although it is difficult to determine whether it served in this capacity. Maximum dimensions of this tool are 162 x 100 x 25 mm. The two remaining slabs are fragments from F37-L2.

OCCUPATIONAL HISTORY AND LOCAL CHRONOLOGY

The artifacts and their depositional context reflect the presence of as many as three cultural traditions at the Walker-Hooper site: an Archaic, a Woodland, and an Upper Mississippian. These traditions will be discussed in the order of their appearance as life-ways in Wisconsin.

ARCHAIC. Evidence for a preceramic occupation is predicated primarily on the stylistic form of some stemmed and notched projectile points. Of the points, O and U in Plate 20 are representative of forms commonly regarded as Archaic in Wisconsin. The former is of the Durst Stemmed type (Wittry 1959:179-180). Wittry considers this a late Archaic point type in Wisconsin, which perhaps continued into the Middle Woodland in subdued importance (ibid:219). Both of these points were found in level 2 of unit 67. A fragment of a straight stemmed point may represent a middle to late Archaic point type (T in Plate 20), which also continued into succeeding traditions (e.g. Wittry 1959:252; Fowler 1959: Figure 14). Because these point types are found in traditions other than the Archaic, they cannot alone be considered conclusive evidence of the presence of an Archaic settlement.

The orifice of Feature 49 (which intersects unit 67) was encountered 1.6 feet below the plow zone. The pit and the chalcedony knife (?) fragment associated with it (D in Plate 17), probably represent a preceramic occupation. This pit is also segregated from all other features by an unusually low soil pH of 6.0. Another Archaic trait may be the adzes or choppers made from the green stone boulders underlying the site (Plate 18). All but one of these artifacts were closely grouped in the area of House I. One adze was 2.5 feet below the plow zone in an otherwise sterile C horizon. Although this artifact may have reached this position during the digging of contiguous pits by Mississippian peoples, there is some evidence in Wisconsin, that tools of this form are a trait of the Archaic (e.g. Wittry 1959: 222, 247).

WOODLAND. The most abundant category of ceramics at the Walker-Hooper site is shell-tempered. However, a small but diversified sample of grit-tempered sherds with stylistic attributes typical of the Woodland tradition are intermingled with the larger category.

Table 35. Attribute associations and measurements of oxidized miniature vessels

unit/feature	level/house	CLASS													mean width in mm.				ext. color	int. color	vessel height
		I	II	III	IV	V	VI	XI	XII	XIII	XIV	XV	XVI	XVII	shoulder	neck	lip	rim			
F23	NV	1	-	-	6	2	9	1	1	-	-	-	-	-	10	7	4	5	1	1	
F37	1	1	-	-	-	1	6	2	1	-	-	-	-	-	11	6	6	6	1	1	
	2	7	-	-	2	3	24	1	1	-	-	-	-	-	9	9	7	10	1	1	
	3	1	-	-	8	2	12	2	1	-	-	-	-	-	12	5	5	5	1	1	
		1[a]	-	-	-	2	-	2	-	-	-	-	-	-	6	-	5	-	1	1	
		1	-	-	-	2	-	2	-	-	-	-	-	-	5	-	3	-	1	1	
F45	1	1	-	-	-	2	-	2	-	-	-	-	-	-	6	-	4	-	1	1	
F46	1	2	-	-	-	2	6	3	1	-	-	-	-	-	6	4	3	4	1	1	
F48	1	1	-	-	-	2	-	2	1	-	-	-	-	-	6	-	4	-	1	1	
	2	-	-	-	-	2	-	2	1	-	-	-	-	-	9	-	3	-	1	1	
	4	3	-	-	6	2	19	1	1	1	1	3	14	1	7	8	5	7	1	1	
		1	-	-	-	2	-	2	1	-	-	-	-	-	5	-	5	-	1	1	
F58	2-3	1[b]	3	1	2	1	21	1	1	1	1	3	15	3	7	6	7	6	1	1	
F64	2	1	-	-	-	2	-	2	1	-	-	-	-	-	6	-	5	-	1	1	40
F66	3	1	-	-	8	2	7	2	1	-	-	-	-	-	8	6	5	5	1	1	
F71	1	1	-	-	-	2	-	2	1	-	-	-	-	-	6	-	3	-	1	1	35
F75	NV	1	-	-	6	2	11	1	1	-	-	-	-	-	6	6	3	5	1	1	
60	H2	1	-	-	-	2	-	2	1	-	-	-	-	-	5	-	3	-	1	1	
61	H2	4	-	-	6	2	12	1	1	-	-	-	-	-	8	6	3	4	1	1	
		1	-	-	6	2	18	1	1	-	-	-	-	-	8	9	5	7	1	1	
78	H1	1	-	-	-	2	-	2	1	-	-	-	-	-	6	-	3	-	1	1	28
11	1	1	-	-	6	1	13	1	1	-	-	-	-	-	6	6	5	6	1	1	
40	2	1[c]	-	-	6	2	8	1	1	-	-	-	-	-	5	4	4	3	1	1	
41	1	1	-	-	6	1	6	1	1	-	-	-	-	-	3	3	3	3	1	1	
44	1	1	-	-	6	1	17	1	1	-	-	-	-	-	8	6	5	5	1	1	
85	1	1	4	1	-	3	16	1	1	1	1	1	16	3	5	6	5	5	1	1	

a - part of same bowl in Feature 37, level 2
b - shoulder is sub-angular
c - part of same bowl in Unit 40, level 1

Table 36. Attribute associations of unattached lips and rims of oxidized miniature vessels

unit/feature	level/house	unattached rims											unattached lips				
		Class I	Class II	Class III	Class IV	Class V	Class VI	Class IX	Class X	neck thickness	rim thickness	lip thickness	no. of lips	Class I	Class II	Class III	lip thickness
F14	NV												2	1	-	-	3
F18	NV	7	8	6	6	2	7	-	-	3.5	4	4	1	1	-	-	4
F37	1												5	1	-	-	
	2	1	-	-	6	2	11	-	-	4	4	3	4	1	-	-	
		1	-	-	6	2	11	-	-	5	4	3	1	1	1	6	5
	3												7	1	-	-	
F38	2												1	1	-	-	5
F38-9	1	1	-	-	8	2	12	-	-	5	4	4					
F45	1	1	-	-	6	2	9	-	-	4	3	2					
F46	1												1	1	-	-	3
F48	2												2	1	-	-	5
	3												1	1	-	-	5
	4												1	1	-	-	2
													1	6	-	-	5
													1	7	-	-	4
	5	1	-	-	2	3	24	-	-	7	9	5	1	1	-	-	4
F50	1	1[a]	8	6	6	1	16	-	-	7	6	6	1	2	-	-	5
		1	-	-	6	2	13	-	-	7	5	4					
F58	4												1	1	-	-	4
F63	3												1	1	-	-	3
F64	2	1	-	-	6	2	11	-	-	5	3	2	8	1	-	-	
		7	-	-	6	3	17	-	-	6	7	7					
	3												1	1	8	6	3
F66	2												1	1	-	-	
	3												1	1	-	-	3.5
F69	2												1	2	-	-	4
F70	2												2	1	-	-	4
F74	3												1	1	-	-	5
	4												2	1	-	-	4
56	H2	1	-	-	2	3	21	-	-	5	6	4					
57	H2	2	-	-	6	1	10	-	-	5	5	5	1	1	6	-	5
													2	1	-	-	4,2
58	H2												5	1	-	-	
60	H2												1	1	-	-	3
65	H2	1	-	-	6	2	12	-	-	7	6	4					
76	HI	7	-	-	2	2	21	-	-	8	7	7					
79	HI												1	1	-	-	4
83	HI	1	-	-	6	2	12	-	-	6	5	4	2	1	-	-	3

Table 36. (Continued)

unit/feature	level/house	unattached rims											unattached lips				
		Class I	Class II	Class III	Class IV	Class V	Class VI	Class IX	Class X	neck thickness	rim thickness	lip thickness	no. of lips	Class I	Class II	Class III	lip thickness
84	HI												2	1	-	-	7
													1[b]	2	-	-	
85	HI												1	2	-	-	5
88	HI												1	1	-	-	5
													1	2	-	-	
89	HI												1	1	-	-	2
27	1												1	7	1	6	4
40	1												1	1	-	-	3
													1	4	-	-	5
													1	5	-	-	5
41	1	2[f]	-	-	2	1	21	6	1	6	6	5	5	1	-	-	
		1	8	6	6	2	6	3	2	4	3	3					
42	1	1	8	6	6	1	14	-	-	6	6	5	3	1	-	-	
		1	-	-	6	2	12	-	-	9	5	3					
43	1	2	-	-	6	2	19	-	-	8	6	4	2	1	-	-	3
44	1												1	2	-	-	4
													1	1	8	6	5
45	1	2	8	6	6	2	8	-	-	5	4	3	4	1	-	-	
48	1												8	1	-	-	
53	1												4	1	-	-	
58	1												2	1	-	-	4
59	1												1	1	-	-	3
60	1-2	1	8	6	6	2	11	-	-	6	5	4					
63	1												1	1	-	-	3
													1	2	-	-	6
65	1	2	2	4	2	2	22	-	-	8	7	6					
67	1												1	1	-	-	4
73	1												1	3	-	-	3
85	1	1[d]	8	6	2	2	30	-	-	8	6	5					
	2	1	-	-	2	3	20	-	-	7	8	6					
90	1												1	2	-	-	5
91	1	2[d]	-	-	2	1	23	-	-	9	8	6	1	2	-	-	5

a - part of same pot in level 2
b - hole drilled through rim 8 mm. below lip
c - five punctates localized on rim, no pattern
d - hole drilled through rim 10 mm. below lip

Table 37. Decorated shoulder sherd techniques and elements of oxidized miniature vessels

unit/feature	level/house	no. of sherds	Class XIII shoulder decoration technique	Class XIV width of trailed lines	Class XV shoulder design	Class XVI shoulder design elements	sherd fragment design elements
F48	4	1	1	1	3	13	-
		1	15	-	4	-	10
	5	1	1	1	2	-	6
F58	2	1	1	2	1	-	3
	3	1	1[a]	1	3	14	-
		1	1	1	2	15	-
		2	1	1	1	-	3
F70	1	1	1	1	1	-	2
F71	1	1	1	1	3	1	-
77	HI	1	1	1	3	13	-
41	1	3	1	1	1	-	2
42	1	1	1	1	1	-	-[b]
		1	1	1	3	-	-[c]
85	2	1	1[d]	1	2	-	6
90	1	1	1	1	1	-	3

a - part of same vessel in level 5; b-g:sherd illustrated in Plate 7,E; d- sub-angular shoulder attached

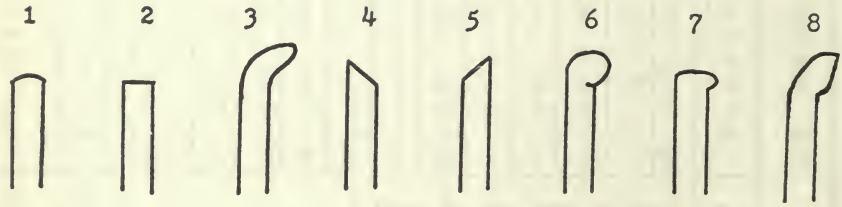


Figure 9. Lip profile elements - Class I (interiors to left)

Table 38. Provenience and attribute associations of unattached rims and provenience of decorated body sherds with grit-temper

unit/feature	level/house	unattached rims					decorated sherds							
		Class I	Class II	Class III	Class V	rim/lip thickness	rocker stamping	incised over cord-marking	pseudo-cord-marking	cord-impressed 1	cord-impressed 2	cord-impressed 3	large Z C-M	large S C-M
F44	NV						1							
F45	1							1						
F50	1						1							
F51	1	2	1	2	3	5/6								
F59	1	3	-	-	2	6/5								
F65	1	2	-	-	2	6/5								
F66	1	3	-	-	2	6/4								
F68	1								1					
	2						1							1
F70	1										1			
	2	2	-	-	2	6/5								
58	H2	5	-	-	-	-/6	1							
60	H2									1				
62	H2						2				1			
84	HI	2	-	-	2	5/4								
88	HI	1	-	-	2	3/2								
11	1	2	-	-	2	6/5								
25	1								2					
40	2												1	
44	1	1[a]	-	-	3	12/5								
55	1									1				
58	2						1							
63	1							2				1		
	2							1						
65	1									1				
73	1									1				
78	1													1
	4													1
82	1							1						
83	2								1					
85	3	1	-	-	2	6/5								
Sf.	-	3	-	-	2	6/4							1	1

a - part of vessel in level 1 of Unit 40

Table 39. Attribute associations and measurements of shell-tempered vessels

unit/feature	level/house	CLASS															mean width in mm.				ext. color	int. color	food encrust.	pottery type	rim diameter
		I	II	III	IV	V	VI	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	shoulder	neck	rim	lip					
F5	2	1	-	-	2	3	32	-	-	1	1	-	-	-	-	-	6	8	9	8	2	2	-	4	24
	1-2	1	6	7	1	3	60	-	-	1	1	-	-	-	-	2	4	7	9	6	1	1	-	4	38
F6	2	1	7	3	2	2	21	-	-	1	1	-	-	-	-	2	4	9	8	5	6	3	-	2	16
		1	-	-	1	1	47	-	-	1	1	-	-	-	-	-	5	9	8	6	1	1	-	4	
	3	1	-	-	5	2	18	-	-	1	1	-	-	-	-	-	5	8	7	3	2	5	-	4	18
		1	-	-	2	2	28	-	-	1	1	-	-	-	-	-	6	6	6	4	2	5	-	4	
	3-4	1	1	6	6	2	6	-	-	1	1	-	-	-	-	2	4	4	3	2	1	1	-	2	14
	NV	4	-	-	5	2	21	-	-	1	1	-	-	-	-	-	5	11	10	9	2	6	-	4	
		1	-	-	2	2	22	-	-	1	1	-	-	-	-	-	6	7	6	5	2	2	-	4	
		1	-	-	1	3	41	-	-	1	1	-	-	-	-	-	6	8	8	6	2	5	-	4	
F10	2	1	7	3	2	1	30	-	-	1	2	-	-	-	-	2	4	6	5	4	3	1	-	2	
	NV	1	-	-	2	3	27	-	-	1	1	1	2	3	11	1	5	7	8	4	2	6	x	3	16
F12	NV	2	5	5	1	2	42	-	-	1	2	-	-	-	-	2	5	10	9	5	2	2	-	2	
F14	NV	1	-	-	2	3	34	-	-	1	1	1	2	3	1	1	5	8	9	4	2	2	-	3	
F23	NV	2	-	-	7	1	44	-	-	1	1	-	-	-	-	-	6	9	6	9	6	6	x	4	30
F29	NV	1	1	6	1	2	44	-	-	1	1	-	-	-	-	2	3	9	8	5	6	2	-	2	
F33	1	2	-	-	1	3	42	-	-	1	1	-	-	-	-	-	4	7	8	5	2	2	-	4	24
F37	1	2	-	-	1	2	37	-	-	1	1	-	-	-	-	-	2	5	7	3	2	2	-	4	
	1-2	1	-	-	2	1	26	1	2	1	1	1	1	2	6	4	3	4	4	3	1	1	-	1	
	2	1	-	-	1	3	48	-	-	1	1	-	-	-	-	-	4	5	7	4	6	3	-	4	
		1	-	-	1	2	44	-	-	1	1	-	-	-	-	-	5	7	6	5	3	3	-	4	
	3	2	-	-	2	2	24	-	-	1	1	-	-	-	-	-	5	6	5	4	6	2	-	4	14
F38	1	1	-	-	1	1	42	-	-	1	1	-	-	-	-	-	7	9	10	6	2	2	-	4	20
F38-9	1	6	-	-	9	3	9	-	-	1	1	-	-	-	-	-	4	5	5	6	1	1	-	4	20
F45	2	4	1	2	5	2	19	-	-	1	1	-	-	-	-	2	6	9	7	5	6	6	-	2	22
	a	5	-	-	1	1	53	-	-	1	1	-	-	-	-	-	6	9	8	7	5	6	-	5	34
		1	-	-	2	3	21	-	-	1	1	-	-	-	-	-	6	7	7	6	2	6	-	4	14
		1	1	6	2	2	31	-	-	1	1	-	-	-	-	2	6	11	9	6	6	3	-	2	
		1	-	-	2	2	24	-	-	1	1	-	-	-	-	-	6	8	5	3	6	6	-	4	
F46	1	1	2	4	2	2	25	-	-	1	1	-	-	-	-	2	4	7	7	4	3	3	-	2	30
F47-8	1	1	-	-	1	1	36	-	-	1	1	-	-	-	-	-	6	7	7	4	2	6	-	4	
F48	2	1	-	-	1	2	54	-	-	1	1	-	-	-	-	-	6	16	11	4	3	3	-	4	
	2-3	1	5	5	1	2	45	-	-	1	1	-	-	-	-	2	3	8	7	5	2	6	-	2	24
	3	1	1	6	1	2	48	-	-	1	1	-	-	-	-	2	6	8	7	6	2	2	-	2	
		1	-	-	2	2	27	-	-	1	1	-	-	-	-	-	5	7	6	5	6	6	-	4	18
		1	1	6	1	2	36	-	-	1	1	-	-	-	-	2	3	9	7	4	2	2	-	2	
		1	7	3	8	3	40	-	-	2	1	-	-	-	-	2	3	6	7	3	6	6	-	2	
	4	1	-	-	1	2	38	-	-	1	1	-	-	-	-	-	5	8	7	4	2	2	-	4	
		4	4	1	1	2	37	-	-	1	1	-	-	-	-	2	5	8	7	6	3	3	-	2	
		4	-	-	1	1	42	-	-	1	1	-	-	-	-	-	5	7	7	7	2	2	-	4	40

Table 39. (Continued)

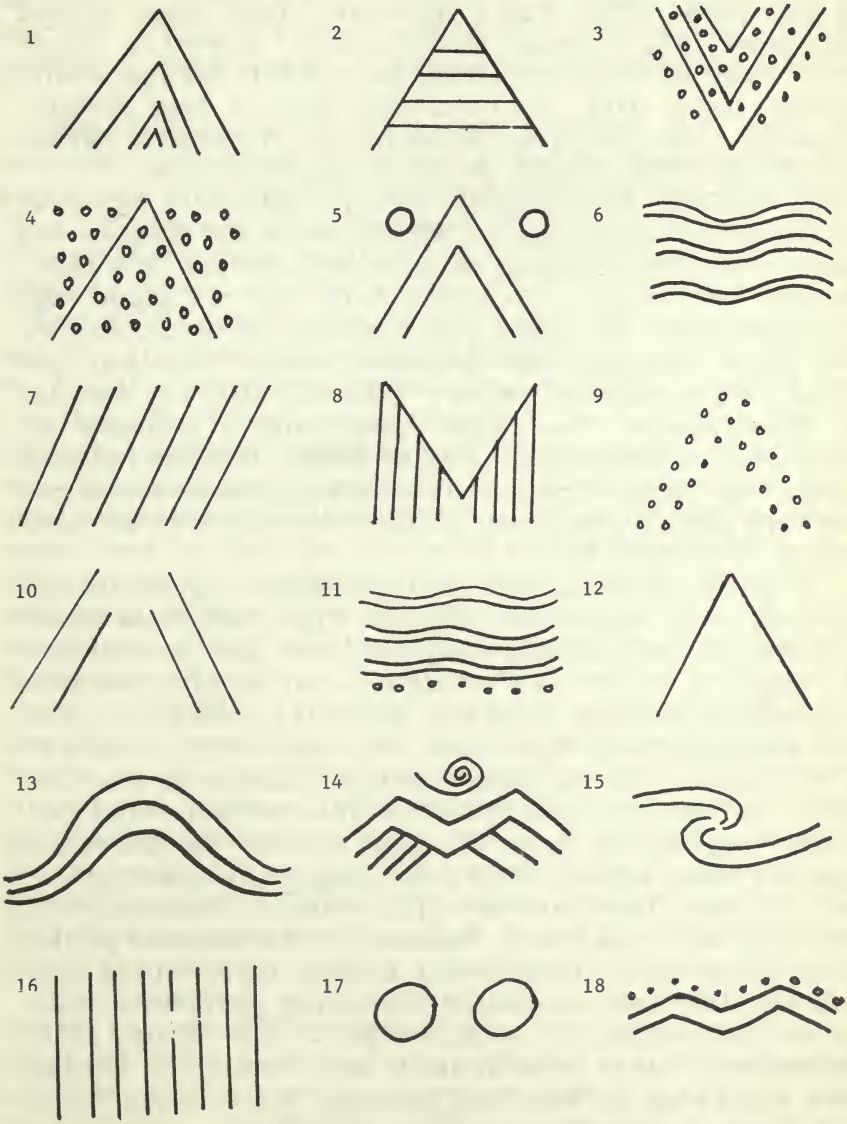
unit/feature	level/house	CLASS															mean width in mm.				ext. color	int. color	food encrust.	pottery type	rim diameter
		I	II	III	IV	V	VI	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	shoulder	neck	rim	lip					
F54	NV	1	2	4	2	2	32	-	-	1	1	-	-	-	-	2	5	7	7	4	2	2	-	2	
		1	-	-	1	3	63	-	-	1	1	-	-	-	-	-	7	8	9	6	2	2	-	4	
F58	2	1	5	5	1	3	53	-	-	1	1	-	-	-	-	2	7	8	9	7	6	2	-	2	
	3	1	-	-	2	3	27	-	-	1	1	-	-	-	-	-	5	7	8	4	2	2	-	4	22
		1	2	4	1	2	37	-	-	1	1	-	-	-	-	2	7	8	6	5	6	3	-	2	
F68	1	1	-	-	-	3	37	-	-	1	1	-	-	-	-	-	3	8	8	4	6	1	-	4	24
		2	-	-	6	3	19	-	-	1	1	-	-	-	-	-	5	7	6	5	3	3	-	4	12
F70	1	1	2	4	1	2	36	-	-	1	1	-	-	-	-	2	5	7	6	4	2	2	-	2	
	2	4	5	5	1	3	42	-	-	1	1	-	-	-	-	2	6	5	7	7	6	2	-	2	22
F73	1	4	-	-	1	3	42	-	-	1	1	-	-	-	-	-	7	10	8	7	1	1	-	4	
	3	1	-	-	1	2	53	-	-	1	1	-	-	-	-	-	5	13	9	5	2	3	-	4	26
F74	4	1	-	-	4	2	25	-	-	1	2	-	-	-	-	-	4	11	8	6	2	1	-	4	24
		4	-	-	5	2	25	-	-	1	2	-	-	-	-	-	4	10	7	5	5	5	-	4	24
		1	-	-	2	1	30	-	-	1	1	-	-	-	-	-	7	6	5	4	1	1	-	4	
	5	2	-	-	6	2	11	-	-	1	1	-	-	-	-	-	3	5	5	4	1	1	-	4	
F75	NV	1	-	-	1	3	59	-	-	1	1	-	-	-	-	-	8	11	10	5	2	2	-	4	40
		2	-	-	6	2	13	-	-	1	1	-	-	-	-	-	8	7	6	5	2	2	-	4	
		1	1	6	2	1	26	-	-	1	1	-	-	-	-	2	5	6	7	4	2	2	-	2	
F76	NV	2	-	-	2	2	23	-	-	1	1	-	-	-	-	-	3	7	5	4	5	2	-	4	10
61	H2	2	2	4	2	1	29	-	-	1	1	-	-	-	-	2	5	5	5	5	3	2	-	2	22
		4	-	-	2	2	32	-	-	1	1	-	-	-	-	-	3	5	4	3	2	6	-	4	
		2	-	-	6	1	11	-	-	1	1	-	-	-	-	-	7	5	4	4	2	2	-	4	
62	H2	1	-	-	1	2	56	-	-	1	1	-	-	-	-	-	-	12	11	4	2	2	-	4	
73	HI	4	-	-	5	2	20	-	-	1	2	12	3	5	5	1	5	11	8	5	2	2	-	3	
83	HI	4	-	-	1	3	51	-	-	1	1	-	-	-	-	-	3	6	6	4	3	3	-	4	30
		1	7	3	2	1	21	-	-	1	1	-	-	-	-	2	5	7	6	4	3	2	-	2	
85	HI	1	-	-	2	2	29	-	-	1	1	-	-	-	-	-	4	7	6	5	1	1	-	4	22
		1	-	-	2	1	20	-	-	1	1	-	-	-	-	-	2	4	4	3	3	1	-	4	10
88	HI	2	4	1	2	3	33	-	-	1	1	-	-	-	-	2	4	7	8	10	1	1	-	2	
		1	1	2	2	1	26	-	-	1	1	-	-	-	-	2	6	6	6	4	2	2	-	2	
89	H2	4	-	-	3	2	1[illegible]	-	-	1	2	-	-	-	-	-	3	12	8	5	6	6	-	4	
2	1b	2	5	5	1	1	30	-	-	1	1	-	-	-	-	2	6	8	6	5	3	2	-	5	24
25	1	1	-	-	2	2	22	-	-	1	1	-	-	-	-	-	4	7	7	4	6	2	-	4	20
26	1	2	-	-	2	2	33	-	-	1	1	-	-	-	-	-	6	9	10	5	6	2	-	4	
27	1	3	1	6	2	3	23	-	-	1	1	1	1	1	10	3	5	5	6	6	1	1	-	-	
29	1	2	1	6	1	1	42	-	-	1	1	-	-	-	-	2	5	7	7	5	2	5	-	2	20
		2	-	-	6	1	16	-	-	1	1	-	-	-	-	-	10	6	5	6	1	2	-	4	
30	1	1	7	3	2	1	33	-	-	1	1	-	-	-	-	2	6	7	7	6	6	5	-	2	
		2	-	-	1	2	42	-	-	1	1	-	-	-	-	-	6	9	8	5	2	2	-	4	
34	1	1	-	-	2	2	23	-	-	3	1	-	-	-	-	-	6	8	7	5	5	5	-	4	32
39	1	4	-	-	1	3	40	1	2	1	1	-	-	-	-	5	4	7	8	6	2	3	-	2	

Table 39. (Continued)

unit/feature	level/house	CLASS															mean width in mm.				ext. color	int. color	food encrust.	pottery type	rim diameter
		I	II	III	IV	V	VI	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	shoulder	neck	rim	lip					
39	1	2	-	-	8	1	16	-	-	2	1	-	-	-	-	-	5	5	4	4	1	1	-	4	14
40	2	1	-	-	2	3	25	-	-	1	1	-	-	-	-	-	5	7	7	4	2	2	-	4	
44	1	2	-	-	2	3	32	-	-	1	1	-	-	-	-	-	6	8	9	5	6	6	-	4	
50	1	7	-	-	1	1	50	-	-	1	1	-	-	-	-	-	8	10	8	8	6	6	-	4	
66	1	1	1	6	2	1	26	-	-	1	1	-	-	-	-	2	4	5	5	3	2	6	-	2	
78	1	1	-	-	1	2	36	-	-	1	1	-	-	-	-	-	4	7	6	5	2	6	-	4	22
84	3	1	-	-	6	2	15	-	-	1	1	-	-	-	-	-	5	6	5	4	2	6	x	4	
85	1	1	-	-	6	2	13	-	-	1	1	-	-	-	-	-	8	6	5	4	2	6	x	4	20
	2	2	-	-	1	2	47	-	-	1	1	-	-	-	-	-	5	7	8	5	3	3	-	4	26
87	1	4	-	-	1	2	36	-	-	1	1	-	-	-	-	-	5	11	7	5	2	2	-	4	
90	1	1	-	-	1	2	41	1	2	1	1	-	-	-	-	5	5	8	6	5	2	2	-	2	
93	1-2	2	-	-	2	2	22	-	-	1	1	-	-	-	-	-	5	6	5	4	5	5	-	4	20
95	1-2	1	-	-	1	3	49	-	-	1	1	-	-	-	-	-	7	8	10	5	2	2	-	4	
miniature jars																									
F37	3	4	1	2	c	1	13	-	-	1	2	16	-	4	17	3	3	5	4	4	6	2	-		
F38	1	1	1	2	d	2	11	-	-	1	1	3	1	5	18	3	6	6	3	3	3	3	-		
F48	4	1	-	-	e	1	24	-	-	1	1	-	-	-	-	-	4	5	4	3	3	3	-		
85	1	1	-	-	6	2	11	-	-	1	1	1	1	1	12	1	3	3	3	2	3	3	-		
Sf.	-	1	1	2	6	1	13	-	-	1	1	-	-	-	-	2	3	4	4	3	2	2	-		
miniature bowls																									
76	HI	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	6	2	2	-		
83	HI	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	3	3	3	-		
85	2	4	2	4	-	-	-	-	-	-	-	-	-	-	-	2	5	-	-	5	2	2	-		

a - grooved paddling on body; b - grooved paddling restricted to shoulder; c - left in B, Fig.16; d - second from right in B, Fig.16; e - second from left in B, Fig.16

Figure 10. Shoulder Design Elements



a) EARLY WOODLAND. Thick sherds having incised lines over cord-marking on the exterior surface (i in bodysherds) were at one time considered representative of the Early Woodland in this area. They have been included in the purportedly Early Woodland type Dane Incised (Baerreis 1952; Keslin 1958:203-205). However, recent excavations have demonstrated, that vessels decorated with incised lines over cord-marking have a long history, extending into the Late Woodland in Wisconsin (Mason 1966:97-99, 1968; Hurley, personal communication).

b) MIDDLE WOODLAND. Stylistic attributes that may represent an occupation by Middle Woodland peoples are plain rocker impressions on a smooth surface (h in bodysherds) and vessels decorated with vertical plain edge impressions on the upper rim exterior (el in rimsherds). The latter resemble the proposed Middle Woodland type Leland Cord-Marked (Wittry 1959:207-209). In addition to these sherds, the single sherd with a stamped impression (n in bodysherds) may be Middle Woodland (Mason 1966). Non-ceramic traits include the small Monona Stemmed point and possibly two other points, that may be of the same type (V-X in Plate 20).

c) LATE WOODLAND. Late Woodland types include Madison Cord Impressed, Madison Plain, and Point Sauble Collared. Mason has suggested that these types are variants of "Madison Ware" and belong together as expressions of a common cultural tradition (1966:151). Madison Plain and Madison Cord Impressed are specifically associated in Wisconsin with the Effigy Mound Tradition by Baerreis (1953) and Wittry (1959:197-207). Non-ceramic traits generally regarded as Late Woodland include the Kolterman Indented Base knives. Wittry has suggested an association for this knife type with the Effigy Mound Tradition, for a specimen was found with Madison Cord Impressed pottery in an otter effigy (Wittry and Bruder 1955; Wittry 1956, 1959:185-186). An associated cremation provided a radiocarbon determination of A.D. 726 ± 250 (Wittry 1956). Undoubtedly, other stone artifacts and some of the debitage were discarded by Woodland peoples, but it is practically impossible to identify these items at this time.

UPPER MISSISSIPPIAN. The depositional context of the vast majority of artifacts and debris is sufficient evidence, that the most intensive occupation at the site was Upper

Mississippian. Radiocarbon dates were obtained on wood charcoal taken from four Mississippian features.

WIS 268	710±45 B.P.	1240 A.D.	Feature 6, level 4
WIS 270	720±55 B.P.	1230 A.D.	Feature 48, level 3
WIS 277	750±55 B.P.	1200 A.D.	Feature 74, level 5
WIS 290	740±50 B.P.	1210 A.D.	Feature 65, level 1

The absence of over-lapping features and signs of extensive rebuilding in Areas 4 and 5 suggests that the houses were occupied for a relatively brief period of time. Area 3 also lacks indications of a long or at least an intermittant period of utilization by Mississippian peoples. However, there is some evidence for time depth in Areas 1 and 2. Trench 2 (the "path") overlay pits 11, 15, 16 and 17, as well as a postmold of Palisade B. Pits 13, 28 and 54 overlay postmolds of Palisade A. There seems to be evidence, therefore, of occupation of the site by people of the same cultural tradition both before and after the construction of the major palisade. Because ceramics were the most extensive artifact category, variables of this category were used to test the similarity and dissimilarity of the five areas. An ordination method previously used in ecological studies and in soils was used to calculate numerical indices of similarity between one hundred and twenty-one ceramic attributes chosen for comparison between the five excavated areas of the Walker-Hooper site and between these and the related Bornick site. The results of this analysis have been published in the Bornick site report (Gibbon 1971). Among the Grand River units the analysis revealed a high degree of similarity between the two subareas of Area I for which evidence of temporal difference exists. The first subarea consists of pits 1-11, 15-17 and excavation units 1-3, 5, 7, and 14. The remaining pits and units in Area I compose the second subarea.

The numerical values sustain the assumption, that the site is an essentially homogeneous settlement spanning a relatively brief period of time. Statistical tests conducted in other sections of this report focusing on activity and "preference" similarities within the site also demonstrate the essential homogeneity of the excavated areas. Whether these relationships actually exist and extend throughout the site is an issue that is only tentatively confirmed. Through-

out the remainder of the report, the basic assumption will be, that the occupation of the five areas was sufficiently close and of short enough duration to allow for systematic comparison of units as if they were contemporaneous areas within a settlement.

The great majority of grit-tempered sherds at the Walker-Hooper site are non-diagnostic as to specific cultural associations. Madison Ware and Upper Mississippian pottery have been found associated at several sites in Wisconsin (e.g. McClaughry, Diamond Bluff, Hahn). Plain grit-tempered vessels have also been found in association with several Oneota sites (e.g. Mason 1966: 159-164; Hall 1962:70). Therefore, there is a distinct possibility, that both kinds of pottery may have been made contemporaneously at the site. Three contingency tables were constructed to test the degree of association between them in the five excavated areas. The null hypothesis asserts the samples in each test have been drawn from a single homogeneous universe. It has already been concluded, that the shell-tempered pottery represents a single component.

Grit-tempered sherds with eroded exterior surfaces were not counted; only plain shell-tempered sherds in each of the five areas were used as an indicator of the relative abundance of shell-tempered pottery. With these exceptions, all sherds in each area belonging to one of the categories were counted. The associations tested were between:

1. the distribution of plain shell-tempered sherds and non-plain grit-tempered sherds in the five excavated areas.

level of probability	expected chi-square value	degrees of freedom	observed chi-square value
0.5	9.488	4	146.0

2. the distribution of plain shell-tempered sherds and plain (smoothed) surfaced grit-tempered sherds in the five excavated areas.

level of probability	expected chi-square value	degrees of freedom	observed chi-square value
0.5	9.488	4	237.1

3. the distribution of plain (smoothed) surfaced grit-tempered and non-plain grit-tempered sherds in the five excavated areas.

level of probability	expected chi-square value	degrees of freedom	observed chi-square value
0.5	9.488	4	7.5

The tests as a whole exhibit highly significant differences between the distribution of shell-tempered sherds

and either of the two grit-tempered groups. The null hypotheses that all the proportions between these groups are the same except for chance can be firmly rejected. However, there is insufficient evidence for concluding that the universes from which the two grit-tempered groups were drawn differ in their distributions. Therefore, the null hypothesis that all the proportions between the two groups are the same except for chance is accepted, that is, the two groups of grit-tempered ceramics are tentatively considered homogeneous in their distributions. The increase in density of grit-tempered sherds towards the eastern portion of the site is probably related to the presence of the spring, while the high density of shell-tempered sherds is related to the presence of the two houses. Despite this superficial coincidence in distribution, the chi-square tests strongly point to a lack of association between them. The contingency tables for these three tests are in Appendix B.

One reason for the lack of congruity between shell-tempered and grit-tempered ceramics may be a strong functional independence between them, for human activities in a settlement are not randomly patterned. But the complete absence of grit-tempering at the closely related Bornick site in Marquette County firmly supports the argument for the association of at least the majority of sherds of either temper with different components at the Walker-Hooper site.

THE ECONOMIC BASE

A. Plant and Animal Remains

A large and varied sample of plant and animal remains was recovered from the Walker-Hooper site. Tables summarizing the range and quantity of particular classes of animal are included at the end of this sub-section. The distribution of some of these classes by provenience unit is tabulated in Appendix A. The mammals, birds, and reptiles were identified by Elizabeth Pillaert. Counts of individuals were obtained by taking the highest number of any identifiable bone. Dr. David A. Baerreis identified the fresh-water and terrestrial snails. The fish and fresh-water mussels were identified by the writer. Counts of individual

mussels were obtained by taking the largest number of left or right valves. Lefts and rights of ten fish elements, such as the dentary and opercular, were identified for the large sample of fish and the largest number of any left or right element used to determine the minimum number of individuals. These methods provide a reliable count of the minimum number of individuals, although the actual numbers are undoubtedly higher.

The carbonized plant remains with the exception of wood charcoal and reed remains are listed in Table 40 below. Plant remains were identified by Leonard Blake.

Table 40. Carbonized plant remains

plant remains	number	%
corn cobs	14	4.8
corn grains	118	40.7
hickory nuts	151	52.1
beans (*P. vulgaris*)	3	1.0
squash (*C. pepo*)	1	0.3
acorn	1	0.3
hazelnut	2	0.7
total	290	99.9

The mean row number of corn cobs is 9.9 and the cupule width 6.0. Measurement of grains from the site gave an estimated mean row number of 8.8. Table 41 contains the frequency of cobs and grains in row classes.

Table 60 contains the distribution by provenience of corn cobs, corn grains, and hickory nut shells. The proveniences of the remaining items are: beans - F45-L3, F63-NV, F64-L1; squash - F65-L2; hazelnut shells - F63-L4, H60; acorn shell - F48-L4

Table 41. Distribution of cobs and grains of corn in row classes

row number	8	10	12	14	total
no. of cobs	10	4	2	3	19
% of total	53	21	10	16	100
no. of grains	45	16	5	-	66
% of total	68	24	8	-	100

Table 42. Fresh-water mussel and snail remains

A. fresh-water mussels*

	number
Actinonaias carinata	21
Amblema costata	14
Fusconaia flava	7
Lasmigona costata	20
Ligumia recta	273
Pleurobema coccineum	16
Strophitus rugosus	289
unidentified species	1
(Sphaeriidae	79)
hinges	431
minimum number of individuals	857
estimated pounds of meat	~ 55

(* - provenience of individuals listed in Table 60)

B. fresh-water snails[a]

Amnicola limosa (Say)	58	
Amnicola lustrica (Pilsbry)	6	
Campeloma decisum (Say)	17	
Fossaria dalli (F.C. Baker)	1	(F48-L4)
Helisoma anceps (Menke)	37	
Helisoma campanulatum (Say)	23	
Lioplax subcarinata (Say)	1	(F38-L1)
Physella sp.	2	(F48-L5; F65-L1)
Planorbula armigera (Say)	7	
Planorbula crassilabris (Walker)	1	(F65-L1)
Pleurocera acutum (Raf.)	389	
Promenetus umbilicatellus (Cockerell)	4	
Somatogyrus depressus (Tryon)	3	
Stagnicola catascopium (Say)	1	(F32-L1)
Stagnicola umbrosa (Say)	3	
Valvata tricarinata (Say)	26	
total	579	

([a] - provenience of individuals listed in Table 59)

Table 42. (Continued)

(Table 42 cont.)

C. terrestrial snails [b]

	number	
Anguispira alternata (Say)	3	
Cionella lubrica (Müller)	1	(F46-L1)
Gastrocopta corticaria (Say)	12	
Gastrocopta armifera (Say)	1	(F58-L4)
Gastrocopta contracta (Say)	2	
Gastrocopta holzingeri (Sterki)	1	(F37-L1)
Helicodiscus parallelus (Say)	9	
Stenotrema sp.	1	(F37-L3)
Succinea sp.	13	
Succineidae	3	(1 in H85; 2 in H79)
Triodopsis albolabris (Say)	2	
Triodopsis multilineata (Say)	16	
Vallonia parvula (Say)	1	(U31-L1)
Vertigo ovata (Say)	1	(F48-L3)
Zonitoides arboreus (Say)	28	
Zonitoides nitidus (Müller)	3	
unidentified juvenile	1	(Trench 2)
unidentified fragment	1	(H61)
total	99	

([b] - provenience of individuals listed in Table 59)

Table 43. Vertebrates identified from the Walker-Hooper site

SPECIES	elements	%	minimum no. of individuals	%	estimated lbs. of meat	%
Mammals	1494	72.1	85	51.2	4175	97.7
Blarina brevicauda[1] (Short-tailed Shrew)	2	0.1	1	0.6	-	-
Marmota monax (Woodchuck)	3	0.14	1	0.6	6	0.14
Citellus tridecemlineatus (Thirteen-lined Ground Squirrel)	52	2.51	9	5.42	5	0.12
Tamias striatus (Chipmunk)	8	0.39	4	2.41	2	0.05
Castor canadensis (Beaver)	48	2.32	5	3.01	193	4.52
Peromyscus maniculatus[1] (Deer Mouse)	26	1.25	5	3.01	-	-
Ondatra zibethica (Muskrat)	57	2.75	7	4.22	14	0.33
Microtus ochrogaster[1] (Prairie Vole)	22	1.06	6	3.61	-	-
Zapus hudsonius[1] (Meadow Jumping Mouse)	4	0.19	1	0.60	-	-
Canis sp. (probably domestic dog)	33	1.59	3	1.81	26	0.61
Ursus americanus (Black Bear)	27	1.30	1	0.60	210	4.91
Procyon lotor (Raccoon)	21	1.01	3	1.81	53	1.24
Martes pennanti (Fisher)	1	0.05	1	0.60	7	0.16
Mustela erminea (Shorttail Weasel)	5	0.24	1	0.60	-	-
Taxidea taxus (Badger)	2	0.10	1	0.60	13	0.30
Mephitis mephitis (Striped Skunk)	1	0.05	1	0.60	5	0.12

Table 43. (Continued)

SPECIES	elements	%	minimum no. of individuals	%	estimated lbs. of meat	%
Spilogale putorius (Spotted Skunk)	2	0.10	1	0.60	3	0.07
Lutra canadensis (River Otter)	15	0.72	3	1.81	38	0.89
Ceruus canadensis (Elk)	20	0.97	2	1.20	700	16.38
Odocoileus virginianus (White-tailed Deer)	1145	55.26	29	17.47	2900	67.85
unidentified bones	17,889	-	-	-	-	-
Birds	404	19.50	64	38.55	82	1.92
Gavia immer (Common Loon)	2	0.10	1	0.60	3	0.07
Podilymbus podiceps (Pied-billed Grebe)	2	0.10	1	0.60	-	-
Pralacrocorax auritus (Double-crested Cormorant)	1	0.05	1	0.60	3	0.07
Branta canadensis (Canada Goose)	3	0.14	1	0.60	6	0.14
Anas. platyrhynchos or rubripes (Mallard or Black Duck)	10	0.48	2	1.20	4	0.09
Teal sp. (Teal)	11	0.53	3	1.81	2	0.05
Spatula clypeata (Shoveler)	2	0.10	2	1.20	2	0.05
Aythya collaris or affinis (Ring-necked Duck or Lesser Scaup)	154	7.43	14	8.43	18	0.42
Aythya americana (Redhead)	65	3.14	6	3.61	12	0.28
Aythya valisineria (Canvasback)	9	0.43	4	2.41	8	0.19
Erismatura jamaicensis (Ruddy Duck)	6	0.29	2	1.20	2	0.05
Mergus sp. (Merganser)	1	0.05	1	0.60	2	0.05
Duck sp. (Duck)	112	5.41	16	9.64	20	0.47

Table 43. (Continued)

SPECIES	elements	%	minimum no. of individuals	%	estimated lbs. of meat	%
Accipiter cooperi[1] (Cooper's Hawk)	1	0.05	1	0.60	-	-
Buteo jamaicensis[1] (Red-tailed Hawk)	2	0.10	1	0.60	-	-
Falco sparuerius[1] (Sparrow Hawk)	3	0.14	1	0.60	-	-
Fulica americana (Coot)	2	0.10	1	0.60	-	-
Ectopistes migratorius (Passenger Pigeon)	1	0.05	1	0.60	-	-
Babe virginianus[1] (Great Horned Owl)	10	0.48	2	1.20	-	-
Coruus brachyrhynchos[1] (Crow)	1	0.05	1	0.60	-	-
Passeriforms[1] (songbirds)	6	0.29	2	1.20	-	-
unidentified bones	4,077	-	-	-	-	-
Reptiles	174	8.39	17	10.24	17	0.40
Chelydra serpentina (Snapping Turtle)	13	0.63	2	1.20	5	0.12
Emys blandingi (Blanding's Turtle)	43	2.08	4	2.41	2	0.05
Terrapence carolina (Common Box Turtle)	81	3.91	3	1.81	2	0.05
Graptemys sp. (Map Turtle)	4	0.19	2	1.20	2	0.05
Chrysemys picta (Painted Turtle)	33	1.59	6	3.61	6	0.14
unidentified bones	394	-	-	-	-	-
TOTALS	2072	100.01	166	99.91	4274	100.03

[1] Not considered a food item

Table 44. Fish identified from the Walker-Hooper site

SPECIES	minimum no. of individ.	%	estimated lbs. of meat	%
	3064	100.3	3981.1	99.8
Ictalurus sp. (Bullhead)	793	26.0	396.0	9.9
Aplodinotis grunniens (Fresh-water Drum)	723	24.0	1084.5	27.2
Micropteras sp. (Bass)	680	22.0	1020.0	25.6
Centrarchidae sp. (Crappie)	338	11.0	84.5	2.1
Cottus bairdii (Mottled Sculpin)	78	2.5	39.0	1.0
Semotilus atromaculatus (Northern Creek Chub)	58	1.9	29.0	0.7
Moxostoma sp. (Redhorse)	73	2.4	219.0	5.5
Esox lucius (Northern Pike)	103	3.4	721.0	18.1
Percidae sp. (Perch)	44	1.4	17.6	0.4
Salvelinus sp. (Trout)	49	1.6	245.0	6.2
Lepisosteus sp. (Gar)	18	0.6	72.0	1.8
unidentified species	107	3.5	53.5	1.3

B. Habitat Analysis

The method used to interpret the composition of the local flora and fauna during the period of site habitation is the "scored habitat preference" method (e.g. Cleland 1966). In table 46 mammal, bird, and reptile species have been given two points for primary habitat preferences and a single point for secondary preferences. An indication of the composition of the local habitat is obtained by adding the columns for each site. The following table summarizes the percentages of the habitat preferences.

The percentages in Table 45 suggest an environmental setting essentially identical to that of the early historic period described earlier in this report, i.e. extensive water-

ways and marshland, open deciduous forests, and some grasslands. A chi-square test of the habitat preferences expressed by the animals at the two sites indicates an absence of significant differences in their natural biomes. Although the existence of similar subsistence patterns could disguise actual differences in habitat, the close similarity of the site settings in the early historic period suggests the same may be expected during the period of site occupation.

Table 45. Habitat preferences of mammals, birds, and reptiles expressed in percent for the Walker-Hooper and Bornick sites

site	aquatic	deciduous forest	forest-edge	grassland
Walker-Hooper	44	20	22	14
Bornick	54	20	15	11

(X^2 = 2.7 df = 3 X^2 at .05 = 7.815)

Additional evidence can be obtained about the site microenvironment from the many snails, mussels, and fish. All of the terrestrial snails have a preference for damp areas. Sixty-four percent of the species (T. ALBOLABRIS, H. PARALLELUS, T. MULTILINEATA, A. ALTERNATA, G. HOLZINGERI, Z. ARBOREUS, C. LUBRICA) prefer damp woodlands. The remaining 36 percent are frequent in the flood plains of creeks and rivers. This source of environmental data is evidence for a scattered distribution of trees and shrubs across the site. Today trees and shrubs are confined for the most part to hill tops and areas along the river that have not been farmed.

Most of the fish and mussel species support an interpretation of clearer water in the past, than is now present. Only the bullhead is a regular inhabitant of muddy river bottoms. The remaining fish and mussels prefer shallow waters having a sand or gravel bed.

Table 46. Habitat preferences of mammals, birds, and reptiles from the Walker-Hooper and Bornick sites

species	aquatic	deciduous forest	deciduous forest-edge	grassland
short-tailed shrew	1	2		
woodchuck		2	1	
thirteen-lined ground sq.			1	2
chipmunk		1	2	
beaver	2			
deer mouse			1	2
prairie deer mouse			1	2
muskrat	2			
prairie vole			1	2
meadow jumping mouse			2	1
black bear *		2	1	
raccoon	1	2		
fisher *	1	2		
short-tailed weasel		2	1	
badger			1	2
striped skunk		1	2	
spotted skunk			1	2
river otter	2			
elk			1	1
white-tailed deer		1	2	
snapping turtle	2			
blanding's turtle	2		1	
common box turtle	2		1	
map turtle	2			
painted turtle	2			
common loon	2			
pied-billed grebe	2			
double-crested cormorant	2			
canada goose	2			
mallard/black duck	2			
teal	2			
shoveler	2			
redhead	2			
ring-necked duck	2			
canvasback	2			
ruddy duck	2			
merganser	2			
duck sp.	2			
cooper's hawk			1	1
red-tailed hawk			1	1
sparrow hawk			1	1
coot	2			
passenger pigeon		2		
great horned owl		2		
crow (cosmopolitan)				
songbirds		2		
sharp-tailed grouse			1	1

1 - secondary preference; 2 - primary preference; * - common in coniferous forests

C. Exploitive Pattern

The animal bones and their depositional context reflect a primary emphasis on the exploitation of aquatic resources at both the Walker-Hooper and Bornick sites. Minimum pounds of meat have been estimated for the total numbers of animals in each sample (Tables 41-44). Table 47 below contains the minimum pounds of meat obtained from each class of animal

Table 47. Minimum pounds of meat obtained from animals at the Walker-Hoope and Bornick sites

	animal type				
site	MAMMALS	BIRDS	REPTILES	FISH	MUSSELS
Walker-Hooper	4175	82	17	3981	55
Bornick	1151	18	5	925	14

(X^2 = 12.35 df = 4 χ^2 at .05 = 9.488)

The null hypothesis of no distributional difference between the sites in pounds of meat obtained from animal types is rejected. A significantly larger proportion of meat came from mammals at the Bornick site and from fish at the Walker-Hooper site. This difference may reflect the greater distance of the Bornick site from a river or lake. However, the actual pounds of meat obtained at each site from different habitat types is very similar. Table 48 below is a tabulation of the percent of meat obtained from each habitat type. This breakdown of pounds of meat from a particular species by habitat preferences follows Table 46.

Table 48. Percent of meat from animals by habitat preferences at the Walker-Hooper and Bornick sites

	habitat type			
site	aquatic	deciduous forest	forest-edge	grasslands
Walker-Hooper	53	13	29	4
Bornick	49	12	31	8

The similarity of the two sites in their exploitive patterns can be demonstrated by the use of Chi-square. The

level of probability	expected Chi-square value	degrees of freedom	observed Chi-square value
.05	7.815	3	1.3

null hypothesis of no distributional difference between sites in their emphasis on habitat types exploited is accepted. At each site approximately 50 percent of the meat obtained by hunting and collecting came from an aquatic habitat. Although it is difficult to estimate the amount of energy involved in exploiting an aquatic habitat compared to a forest and forest-edge, it would seem that a much greater effort was expended obtaining small mammals, fish, and birds from waterways. The amount of effort would depend of course on the techniques of exploitation. Harvesting of at least the fish seems to be indicated by the very small size of the fish bones analyzed and by a flat net-sinker found at the Bornick site. Small mesh nets and traps would have been especially effective during the spring, when most of the fish at the site spawned. However, numerous fishhooks and several harpoon heads have been found at the Walker-Hooper site during earlier excavations (McKern 1945).

Meat and plant foods were not the only source of calories at the Walker-Hooper site. The large numbers of smashed bone strewn throughout the site probably indicate the practice of making bone grease (e.g. Leechman 1951). Approximately 92 percent of the mammal, bird, and reptile bones are too small to identify. This practice is also indicated by the kinds of bones not smashed, e.g. the lower leg bones of large herbivores. Hickory nut shells were also smashed into small pieces. Perhaps they too were boiled and the resulting oil skimmed from the top of the water.

The importance of other kinds of food is difficult to determine. Although only a few hundred grains of corn were recovered, their scattered distribution throughout the site would seem to indicate that corn was quite common. The size and number of storage pits are interpreted as supporting this conclusion. However, Cleland has suggested that the presence of an economy based on horticultural activities should be reflected in the faunal proportions (1966:42-45). Because hunting is not a full time occupation, an emphasis on those animals such as deer which supply a large amount of meat for the effort expended should be noticeable in the site debris. Faunal proportions from Cahokia, Aztalan, Carcajou Point, Lasleys Point, and the Bell site are listed

in support of this argument (ibid:80-88). How are the faunal proportions from the Walker-Hooper site to be interpreted within the context of this hypothesis?

While a focus on large herbivores is not apparent in the faunal proportions of either the Walker-Hooper or Bornick site, several other lines of inquiry suggest that the determination of the relative importance of domesticated plants in the diet may not be so easily resolved. Three indices have been constructed in order to facilitate comparisons between sites. These indices and the sites compared are:

index		Carcajou Point	Walker-Hooper	Bornick
$I_1 = 100 \times \frac{\text{no. of pits}}{\text{sq. feet excavated}}$	=	2.9	3.3	1.0
$I_2 = 100 \times \frac{\text{no. of sherds}}{\text{sq. feet excavated}}$	=	135	1039	738
$I_3 = 100 \times \frac{\text{no. of vessels}}{\text{lbs. of meat}}$	=	200	570	370

The interpretation of these indices is equivocal. Approximately 2500 square feet of the Carcajou Point and Walker-Hooper sites were excavated, and only 550 square feet excavated at the Bornick site. The Walker-Hooper and Carcajou Point sites are large stockaded villages, while the Bornick site is a small settlement probably occupied intensively by a single family unit. In addition the Carcajou Point site has several Oneota components. Despite these discrepancies some interesting comparisons can be made. Pit and sherd densities in the single component at the Walker-Hooper site are greater than in the multicomponent Carcajou Point site, which has been interpreted as "primarily agricultural" by Cleland on the basis of faunal proportions (1966:87). Sherd density is also much higher at the Bornick site. If hunting is only of secondary importance in the diet, this emphasis should be reflected by the occurrence of large numbers in the third index. The

numbers obtained for the three sites are the reverse of what should have been expected. Large numbers would presumably indicate a reliance on some other food resource such as domesticated corn. In this comparison only poundage totals for mammals, birds, and reptiles were used. Ideally the total meat poundage should be compared when available.

If pit and sherd densitites and vessel/meat indices are reliable indicators of the exploitive pattern, the relative importance of domesticated plants in the diet of Grand River and early Koshkonong phase sites is at best equivocal. The procurement of approximately 50 percent of the meat supply from aquatic habitats in the exploitive pattern of the two Grand River settlements may indicate the harvesting of fish, mussels, and waterfowl is as focal a pursuit as the exploitation of large herbivores.

SPATIAL ANALYSIS OF ARCHAEOLOGICAL MATERIALS

If we accept the conclusion that the Walker-Hooper and Bornick sites are single settlements spanning relatively brief periods of time, then certain kinds of questions can be asked about the horizontal distribution of artifacts within the Walker-Hooper site and between this site and the Bornick site. Are there well-defined activity differences between areas and sites? Where were male and female activity tasks concentrated? Was the range of activities more varied outside houses than inside?

This analysis is not intended to be exhaustive, rather a limited number of examples are used to illustrate a general conclusion. Chi-square and a verimax factor rotation program with an orthogonally rotated factor matrix were used in an attempt to determine which artifact classes exhibit associated behavior in various areas of the site. Factor analysis is a multivariate technique for obtaining an overview of a large number of correlation coefficients. The common variance they express can be described by a series of broader configurations called factors (Harmann 1961). Factors were obtained on fifty-one variables in six different structural units at the Walker-Hooper site: "site" (all in situ material), house floors, midden, cylinder pits, undercut pits, basin-shaped pits (Tables 49 and 50). Percent

of common variance and factor loadings by set (from 100 90 down to 50-30) are included for each configuration. The artifact identities of the fifty-one variables are listed at the end of Table 50.

If different zones within the excavated areas of the Walker-Hooper site were habitually used as task specific activity centers, these zones should still be discoverable by an analysis of the horizontal clustering of artifact forms and debris. Both the Chi-square and the factor analyses demonstrate a multifunctional use of most areas, although it is possible through the factors to isolate constellations of artifact and debris associations. The relative frequencies of three broad dichotomies of stone artifact and debitage classes were tested for their distributional associations using the Chi-square test. In each test the null hypothesis was that no distributional differences are to be expected within or between sites. The tests of association were between the relative proportions of 1) flakes per chipped stone artifact, 2) unifacially and bifacially retouched artifacts, and 3) "amorphous" and "formalized" chipped stone artifacts. "Formalized" refers to all chipped stone artifacts with regular shapes, such as projectile points and end scrapers. The much larger category of "amorphous" tools is composed almost entirely of retouched flakes. The areas between which their distributions were compared are a) the five excavated areas of the Walker-Hooper site, b) house floors and all midden at the Walker-Hooper site, c) house floors and only the midden immediately around the house floors (Areas 4 and 5) at the Walker-Hooper site, and d) the Walker-Hooper and Bornick sites. The expected Chi-square values, degrees of freedom, and observed Chi-square values for these tests are recorded in Table 51. Test 3c was not conducted. Contingency tables for individual tests showing distributional differences are contained in Appendix B.

The null hypothesis of no distributional difference between compared items was accepted for all but five tests. Within the Walker-Hooper site, there is less chipping activity in Areas 1 and 2 (about 2.5 flakes per chipped stone artifact), than in house areas 4 and 5 (c. 4:1) and Area 3 (6:1). However, this seems to be a reflection of refuse pit content, rather than midden content. When only midden content was compared, the null hypothesis of no distri-

factor	entire site	midden	house floors
1	(19.6%)*	(21.8%)	(23.3%)
100-90		6	50
90-80	44,49	3,7,47	9,45,48
80-70	43,50		42,43
70-60	45,51,5	10,23,42	3,7
60-50	40,41,42	1,8,32,44,45,48,49	13,14
50	1,4,16		
2	(15.6%)	(11.8%)	(14.3%)
100-90		37	35,20
90-80	6,7	22	35,20,17,29
80-70		38	22
70-60	1	50	
60-50	8,10,47		16,31
50	2,9,14,31	30,32,2,31,45	
3	(12.2%)	(8.5%)	(9.6%)
100-90			23,44
90-80	28	43	
80-70	29,48		27
70-60		25,44,46	
60-50	21,37	48	6,31,47
50	14,19	2,5	
4	(7.5%)	(8.0%)	(8.3%)
100-90			
90-80		26,51	
80-70			2,8
70-60		49	
60-50	17,26,34		
50	5,42	42,5,12,45	1,24,28,6,7,3
5	(5.9%)	(6.5%)	(8.2%)
100-90			30,40
90-80		29	
80-70	46	24	
70-60	3		
60-50		19	
50	13,42	14,41,49	2,25,47,49
6	(5.8%)	(6.1%)	(8.1%)
100-90	39	21	10,11
70-60			32,37
60-50	27,34	20	
50		38,2,10,29	1

* percent of variance

Table 49.

factor	entire site	midden	house floor
7	(5.2%)	(5.2%)	(7.2%)
100-90			38
80-70	36	34,36	
60-50	12,24	41	12,25,51,27,43
50		14,45	4,47
8	(4.6%)	(5.1%)	(5.2%)
90-80			4,15
80-70		4	
70-60	32		
50	4,22,37	12,10,23,29,32,45	11,28,43
9	(4.0%)	(5.0%)	(4.6%)
90-80	23	13	
70-60			16
50	47,19	2,8,1,12	24,12,3,9,51
10	(4.0%)	(4.3%)	(4.4%)
80-70		15	5
60-50	35		
50	15,33,45,51	27,13,51,4	1,13,28,51
11	(3.9%)	(4.3%)	(3.8%)
100-90			34
70-60	20		
60-50		5,20,31	
50	22,31,35	8,2,14	13,25
12	(3.6%)	(3.8%)	(3.0%)
80-70			29
60-50	25	23,41	
50	24,47,30	17,19,45	14,51
13	(3.0%)	(3.6%)	
80-70		9	
50	11,31,38	5,48,30,32	
14	(2.6%)	(3.1%)	
70-60		11	
50	40,41	1,3,10,14,23,28	
15	(2.5%)	(3.0%)	
60-50	2		
50	8,13	12,1,3,14,16,18,45	

Table 49. (Continued)

factor	basin	undercut	cylinder
1	(45.6%)*	(35.9%)	(34.6%)
100-90	10,33,43,44 47,48,49,51	5,17,26,30,34,50	5,11,21,22,32 3,9,13,42,46
90-80	5,14,40,41,42,45,50	2,41,42,44,51	12
80-70	1,3,4	3,8,9,11,13	8
70-60	6,7,16,20,27	16	30,47
60-50		4,47,1,6,7,45	
2	(17.6%)	(28.7%)	(29.7%)
100-90	21,36	14,24,28,29,32,48	25,34,37,39 2,27,43,48
90-80	8,12,24	10,37	45
80-70		35,46,49	
70-60	2,6,13	6,21,11,15,19	6,50
60-50	3,4,9	3	
3	(8.1%)	(13.5%)	(19.7%)
100-90	28	31,33	10,33,35,49
90-80			51
80-70	31	35,38,45	44,50
70-60		15	14
60-50		7,47	
50	7,40,41		
4	(5.6%)	(10.5%)	(16.0%)
100-90	26	27,36	31
90-80			
80-70		19,38	4,6,7,30
70-60		1	14,40,47
60-50	35		8,51
50	20	40,7	
5	(4.3%)	(4.2%)	
100-90	46		
80-70		43	
70-60	27		
50	9,30	40,13,10,21,41	
6	(4.2%)	(4.1%)	
100-90	17	22	
50	2,3,8,9,13	47,43,44,46,1	
7	(4.0%)	(3.1%)	
100-90	25		
80-70		16	
70-60		49	
50	24,4,13,31	37,21	

Table 50.

factor	basin
8	(3.2%)
100-90	29
50	40,41,42
9	(3.0%)
90-80	30
50	50,7,45,46
10	(2.3%)
90-80	37
50	51,2,4,9
11	(2.0%)
80-70	23
50	12,1,9

* percent of variance

ARTIFACT VARIABLES

1. shatter
2. decortication flakes
3. weight of debitage in gms.
4. bipolar flakes
5. fired rock
6. unworked chert flakes
7. unworked quartzite flakes
8. unifacially retouched flakes
9. bifacially retouched flakes
10. bipolar cores
11. non-bipolar cores
12. notched flakes
13. flake drills
14. unnotched triangular points
15. notched and stemmed points
16. bifacial knives
17. end scrapers
18. side scrapers
19. perforators
20. grinding stones
21. hammerstones
22. sandstone abraders
23. gouges
24. wedges
25. flake gravers
26. paint stones
27. waste copper
28. worked copper
29. galena
30. deer jaw sickles
31. bone awls
32. beamers
33. bone punches or needles
34. beaver teeth incisors
35. bone ornaments
36. antler projectile points
37. detached tines
38. shell spoons
39. shell fish lures
40. misc. worked shell
41. shell scrapers
42. weight in gms. of shell-tempered sherds
43. ceramic waste
44. 'reduced' sherds
45. no. of fresh water mussels
46. grains of corn
47. no. of mammal bones
48. no. of bird bones
49. no. of reptile bones
50. weight of fish bone
51. no. of fresh water snails

Table 50. (Continued)

butional difference was strongly accepted. The distribution of "amorphous" tools is proportionally similar in all areas, but "formalized" tools appear in greater than expected numbers in Area 2. This difference is also not significant, when only midden content is considered.

All three comparisons between the Walker-Hooper and Bornick sites show significant differences in distributions. There is a greater proportion of unworked flakes per chipped stone artifact at the Bornick site (8:1), than in any single area of the Walker-Hooper site. Bifacially retouched and 'formalized' chipped stone tools also appear in greater relative numbers at the Bornick site.

Three tests of association were made between broad categories of manufacturing and processing tools. The tests of distributional association were between 4) "stone processing" and "wood-bone working" tools, 5) the weight of shell-tempered pottery and the weight of stone debitage, and 6) "male-related" and "female-related" tools. Items in categories included in tests 4 and 6 are listed in Table 52. Tests 5 and 6 are intended to disclose activity areas strongly associated with tasks of one sex or the other. The designation of particular artifacts as male- or female-related is only suggestive. The areas between which their distributions were compared are those used for tests 1-3, i.e. a) the five excavated areas of the Walker-Hooper site, b) house floors and all midden, c) house floors and only midden immediately around the house floors, d) the Walker-Hooper and Bornick sites. Tests 4c and 6c were not conducted.

The null hypothesis of no distributional difference between compared categories was rejected in only two tests. Both of these involved inter-site comparisons. "Stone processing" tools appear in significantly higher proportions than "wood bone working" tools at the Bornick site. There are also more grams of pottery per gram of stone debitage at the Bornick site (13:1), than at the Walker-Hooper site (11:1). The absence of significant differences in the distribution of sex-related activities indicates the lack of strongly demarcated activity zones used by only one sex, site sampling error, or incorrect assignments of specific tools to sex-related activities.

Despite these differences, the range of activities at the two sites seems very similar. All items except storage pits, unworked flakes, ceramic waste, and miniature vessels

in Table 52 were grouped together within their activity classes. The percentages of these classes by site are:

activity	Walker-Hooper	Bornick
1. food procurement	11.4%	13.7%
2. food storage	35.6%	26.9%
3. fabrication and processing	49.5%	55.6%
4. recreation and ornamental	3.5%	3.8%
	100.0%	100.0%

A Chi-square test of association between the percentages of activity emphasis was conducted (no. 7 in Table 51). The null hypothesis of no difference between sites in the emphasis on broad activities is firmly accepted. There is a slightly increased emphasis at the Walker-Hooper site on wood-bone working and drilling-perforating, while general cutting and scraping tools occur in greater proportions at the Bornick site. Except for these differences the relative proportions of items within sub-classes of activities are very similar.

Although the excavated areas of the Walker-Hooper site are very homogeneous in the relative proportions of the various artifact classes present, this same degree of homogeneity is not apparent in the distribution of food debris. Four tests of association using Chi-square were made to illustrate these differences. In each test the null hypothesis was that no distributional differences are to be expected between areas. The tests were between 8) the distribution of mammal, bird, and reptile bones in the five excavated areas of the Walker-Hooper site, 9) the distribution of numbers of mussels and fish in (a) the five excavated areas of the Walker-Hooper site and (b) house floors and all midden, and 10) the distribution of food taken from the river (mussels, fish, turtle) compared to food brought to the Walker-Hooper site (mammals, birds) in the five excavated areas of the larger site.

The null hypothesis of no distributional difference between compared items was rejected in each test. In general a greater relative proportion of mussels are found in Area 2, birds in Area 3, and mammal bones in Area 4. The largest numbers of all animals except turtle occur in the area of House 1. Local river animals except fish occur in much greater relative densities in Areas 2 and 3, than in the area of House 2. These differences seem to indicate a tendency for various food processing activities to occur

in particular regions of the excavated portion of the site. Areas 2 and 3 appear to have been used as general work areas, where mussels, fish, turtles, and birds were prepared for eating. This is indicated by the greater quantities of most kinds of garbage within the midden, rather than refuse pits. The reverse tendency is apparent in the living areas, where most of the garbage except for mammal bone is found in refuse pits. If mammal bones were being smashed and boiled to obtain grease, the subsequent dumping of pots on the house floor might explain this difference in pattern. These differences represent tendencies only and not major work activity areas for the processing of one kind of animal or another. This suggestion is supported by the absence of well-defined zones for separate factors and the presence of the same general range of food processing activities within the five excavated areas of the site.

The use of most areas of the site for multiple tasks by both sexes has obscured the location and spatial configuration of task-specific activity centers and the identification of associated tool-kits and debris. The factor analysis strongly confirms the multifunctional use of most site areas, but it is a more powerful statistical technique allowing us to also isolate constellations of artifacts and their associations with particular spatial units. For example, food processing activities when undertaken within dwellings occurred most intensely in a zone located immediately behind the main hearth. Items in Factor 1 (Table 49 - house floors: fishbones, bird bones, mussel shells, bifacially retouched flakes) represent food preparation activities, which are concentrated behind the hearth covering F65 in unit 83 and in dwindling intensity in units 84, 78, and 77 of House 1, and in units 58, 61 and 60 behind the hearth covering F45 in House 2. Factor 2, an artifact constellation perhaps primarily related to food preparation too (house floors: end scrapers, grinding stones, galena, bone ornaments, sandstone abraders, bifacial knives), is clearly centered in unit 83 in back of the main hearth in House 1. This constellation is poorly defined in House 2. Both Factors 1 and 2 presumably represent female-related artifact-debris constellations.

In contrast activity loci within dwellings for fabrication and stone processing are more diffuse, occurring towards the rear of the floor, immediately in back of the hearth, or

in the entrance. Factor 4, a male-related stone processing complex (house floors: decortication flakes, unifacially retouched flakes, shatter, wedges, unworked chert flakes), is concentrated primarily to the rear of the dwellings (units 72 and 76 in House 1; units 57 and 60 in House 2), although the complex also occurs immediately behind the hearths with the previous constellations (units 83 and 84 in House 1; unit 62 in House 2). Factor 3 is difficult to interpret (house floors: gouges, ''reduced'' sherds, waste copper), but it is concentrated around the hearth in unit 60 of House 2;

Table 51. Chi-square tests for spatial associations of artifact forms and debris

test	level of probability	expected Chi-square value	degrees of freedom	observed Chi-square value
1 a	.05	9.488	4	36.60
b	.05	3.841	1	0
c	.05	3.841	1	0.95
d	.05	3.841	1	13.90
2 a	.05	9.488	4	9.07
b	.05	3.841	1	0.32
c	.05	3.841	1	1.60
d	.05	3.841	1	15.50
3 a	.05	9.488	4	10.25
b	.05	3.841	1	3.40
d	.05	3.841	1	10.00
4 a	.05	9.488	4	4.10
b	.05	3.841	1	3.40
d	.05	3.841	1	5.30
5 a	.05	9.488	4	4.20
b	.05	3.841	1	0.20
c	.05	3.841	1	2.84
d	.05	3.841	1	21.30
6 a	.05	9.488	4	0.70
b	.05	3.841	1	0.10
d	.05	3.841	1	0.20
7	.05	9.488	4	1.80
8	.05	15.507	8	26.30
9 a	.05	9.488	4	89.00
b	.05	9.488	4	45.00
10	.05	9.488	4	12.50
11	.05	15.507	8	8.20
12	.05	5.991	2	1.90
13	.05	5.991	2	3.13
14	.05	3.841	1	1.80

ACTIVITY CLASSES		site area	1		2		3		4			5			male/female related	Bornick site
1. food procurement 2. food storage 3. processing and fabricating			midden	features	midden	features	midden	features	midden	house	features	midden	house	features		
1A	hunting tools	a. triangular points	2	2	12		7	4	3	8	3	6	15	14	M	15
		b. antler projectile points			1						2	1		1	M	2
B	fishing implements	a. shell fish lures												1	M	4
		b. notched net-sinker													M	1
C	horticultural equipment	a. stone hoes	1							1					F	
2A	pottery vessels		10	26	16	7	10	18	12	22	33	21	29	42	F	43
B	storage pits			25		11		3			10			17		5
3A	stone processing	a. unwk. bipolar flks.	6	5	10	2	16	6	3	7	11	11	7	11	M	11
		b. unwk. non-bipolar flks.	72	55	213	49	428	110	236	345	277	353	573	527	M	614
		c. hammerstones		3			1		1		1			4		6
		d. antler flakers		1						2		1		5	M	1
		e. bipolar cores	2		3		6	1	5	6	1	6	6	3	M	6
		f. non-bipolar cores	1	1	2		4		2	1	1	2	2	1	M	2
B	wood-bone working	a. stone celt												1		
		b. gouge			1		1			2		1		1	M	
		c. flake graver					1			1	2	1	3	1	M	
		d. beaver incisor chisel			2						1			1	M	1
		e. notched flake	1	2	4	2	1	1		1	5	5	3	1	M	1
		f. whetstone	1	1			1				1	3	3	1	M	1
		g. wedge			1			1			4		5	1	M	
		(cont.)														

Table 52. Artifacts by activity classes at the Walker-Hooper and Bornick sites

ACTIVITY CLASSES 3. processing and fabricating 4. recreation and ornamental		site area	1		2		3		4			5			male/female related	Bornick site
			midden	features	midden	features	midden	features	midden	house	features	midden	house	features		
3C	drilling-perforating	a. stone drills	2	5	9	2	3	2	9	4	9	7	17	8	-	3
		b. bone awls		1	2		1	1	2	4	3	2	5	3	-	2
		c. bone punchs						1		1		1		2	-	
D	mat-fabric manufacture	a. bone mat needles												2	F	
		b. pottery discs					1	1		1	2		2	4	F	1
E	pottery manufacture	a. ceramic waste	7	3	6	6	54	41	10	20	39	19	24	21	F	12
		b. wash grinder											1		F	
F	general cutting and scraping	a. unif. modified flakes	6	19	27	12	32	9	36	41	39	35	52	49	-	31
		b. bif. modified flakes	2	5	5	6	8	5	7	3	15	12	25	19	-	21
		c. stone scraper			1	1	1		1		2	3	1		-	2
		d. shell scraper			5	1		5			4	4	2	3	F	
		e. stone knife			2		2		1		3	3	2	3	-	1
		f. bone beamer		1	1		1			1		2		1	F	
		g. deer jaw sickle	1	1			1	1			3	2	1	2	M	
G	general food processing	a. mano											1		F	
		b grinding stone						2					1		F	7
		c. pottery ladle												1	F	1
		d. shell spoon					1			1		1		2	-	2
4A	ornaments				3	1	1	2	1	2	1		3	8	-	4
B	miniature oxidized jars		1	2	1		9	8	2	6	10	4	3	6	-	
C	pottery pipes				1	1									M	2

Table 52. (Continued

this constellation may reflect copper working activities.

Other factors derived for house floor areas account for less of the common variance and only a few will be discussed here to confirm the conclusions reached above. Factor 11, probably a wood-bone working complex (house floors: beaver teeth incisors, flake drills, flake gravers), is diffuse, but it concentrates around F59 in the middle of House 1 and to a lesser extent in the very front of the same dwelling. Factor 9, another wood-bone working complex (house floor: bifacial knives, notched flakes, wedges), also concentrates primarily to the rear of House 1 (unit 76) and behind the major hearth covering F65 in unit 83. Factor 6, probably a stone processing complex (house floors: bipolar cores, non-bipolar cores, antler flakers, beamers), is concentrated near the front of House 2 in unit 62. Although not within the house, a similar complex was found in F74 immediately outside the entrance to House 1.

Factors for artifacts and debris in the midden provide constellations reflecting a variety of activities. Only the four dominant factors will be discussed. Factor 1, an artifact constellation related to the prepartion of meals of riverine animals (midden: bipolar flakes, notched flakes, bipolar cores, gouges - and to a lesser extent mussel shells, turtle bones, fishbones), is found most intensely in unit 30 of Area 2 and in unit 89 in front of House 1. Factor 3 appears to represent a general female work activity area (midden: ceramic waste, flake gravers, "reduced" sherds, corn grains) located in units 41, 44, 45, and 48 of Area 3 and in units 85, 89, and 90 in front of House 1. Factor 4 may reflect an activity in which turtles and possibly snails were being prepared for meals (midden: paint stones, snails, turtle bones). This constellation of artifacts and food debris occurred in units 30 and 34 in Area 2 and around F37 in Area 3. The constellation in Factor 2 consists of antler flakers and sandstone abraders; its locus of concentration is unit 85 in front of House 1.

When all structural units are analyzed together, several major themes in general similar to those discussed above account for most of the variance. These themes are cooking (Factor 1), flint-chipping (Factor 2), general cutting-scraping-piercing (Factors 4 and 8), the manufacture of sociotechnic items like beads and pendants (Factors 3 and 10), and wood-bone working (Factors 7, 9, 11?, and 12).

Factor 1 is a female-related food preparation constellation (site: "reduced" sherds, turtle bone, ceramic waste, fish bone, mussel shell, snails, fire-cracked rock), which is located in zones in the front half of both houses and in Area 3. In the area of House 1 this constellation is found around the hearth covering F65 in house floor units 83-85 and 88, and in pits 63, 66, 74, and 75 outside the entrance to the dwelling. The constellation is also found in pits 45 and 48 associated with House 2 and in units 41, 42, 44, 45, 48 and F37 of Area 3. Factor 2, a flint chipping constellation (site: unworked chert, unworked quartzite, shatter), is found throughout the house floor of both dwellings, in units 86 and 90 and pits 58, 59, 65, 66, and 74 associated with House 1, in units 59, 63, and 67 and pits 46-48 and 50 associated with House 2, and in units 30 and 45 and pits 29, 37, and 38 in Areas 2 and 3. The major locus of concentration of Factor 3 is in F74 in front of House 1, but less intense concentrations also occur in units 83 and 84 in the house floor of House 1, units 29, 30, 34, and 35 in Area 2, and in units 44 and 45 in Area 3. Factor 3 is related to the manufacture of sociotechnic items (site: worked copper, galena, bird bone). Factor 4, a constellation of general cutting and scraping tools (site: end scrapers, paint stones, beaver teeth incisors), is concentrated most intensely in F48 outside House 2.

If the family units living within the stockaded Walker-Hooper village were loosely united groups clustering together only temporarily during a period of external social strife, marked areal differences in such complex artifacts as ceramic vessels should be observable. However, if the village was a fairly permanent residence for a number of constantly interacting families, such stylistic preferences might not be well-defined. In order to test this proposition the distribution of several classes of ceramic attributes were analyzed using the Chi-square test of association. Four Chi-square tests are presented here to demonstrate a general conclusion reached from a study of the distribution of a large number of attributes. This conclusion is supported by a study of the distribution of clusters generated by the Pearson product moment coefficient of correlation and the analysis of covariance. The null hypothesis in each test was that no distributional differences of attributes are expected within the site. The tests were be-

tween 11) the distribution of rim profiles (Class IV) in the five areas excavated at the Walker-Hooper site, 12) the distribution of rim profiles in houses and in all midden, 13) the distribution of vessel types (Carcajou Plain, Grand River Plain, and "all other") in houses and in all midden, and 14) the distribution of decorated and non-decorated rim sherds in houses and in all midden outside houses. The results of these tests are recorded in Table 51.

The null hypothesis of no distribution difference on at least a broad basis is accepted in all tests. That some differences do exist has already been demonstrated by the use of the Index of Similarity. The conclusion of general site homogeneity is confirmed by these tests at least for those areas excavated. This conclusion would seem to support an argument for the presence of a number of closely interacting family units having fairly constant interaction over a lengthy period of time within a village community.

Some of the statistical tests made in this section are not necessarily valid, because of the uncertain function of many artifacts and the too restrictive task-identification of others. The removal of most of the midden and floor areas by plow, sampling error, and spring cleaning practices are only a few additional sources of distortion potentially undermining the power of our tests. Perhaps their primary value, especially that of the factor analysis, is the objective demonstration of which artifact variables in our sample sort together and as a result some insight (if only tentative) into the functions of specific artifacts, the composition of tool kits, and the nature and location of activity zones. These artifact con figurations should be viewed as a series of testable hypo theses capable of being confirmed by similar modes of analysis on the same or related sites.

SUMMARY

The Grand River phase of the Oneota tradition is centered in Green Lake and Marquette counties immediately below the deciduous-hardwood tension zone in the prairie forest province of Wisconsin. The Walker Hooper site (47GL65), the type-site of the phase, is a large stockaded village intensely occupied for a short period of time in the thirteenth century A.D. Two palisades, sixty six refuse pits,

and at least two long oval wigwam house structures were found during excavations. A spatial analysis of recovered materials demonstrated multifunctional uses of most site areas and a high degree of homogeneity within the site and between the type site and the closely related Bornick site. A habitat analysis suggested a setting essentially identical to that of the early historic period, i.e. extensive waterways and marshland, open deciduous forests, and some grassland.

The subsistence pattern at both the Walker-Hooper and Bornick sites apparently revolved around the intense exploitation of aquatic resources and maize horticulture. Although it is difficult to evaluate the importance of maize in the diet, the number of storage pits and the distribution of carbonized kernels suggests that it provided a significant if ancillary part of the diet. The Walker-Hooper site represents a large summer agricultural village, while the Bornick site is probably a fall-spring and winter occupation by a single family unit. This type of pattern seems with some exceptions closer to that of the Menomini during their occupation of the northern boundaries of the Carolinian biotic province, than it does to the economic pattern of the historic Winnebago. In the Menomini economic and settlement system the exploitation of aquatic animals, especially fish, was a major activity, there was no communal buffalo hunt, and the role of agriculture was "well-established," but ancillary; they lived in large permanent villages during the summer, but in September the tribe moved around ricing lakes for the harvest and in winter spread out along family lines in search of game and furs. Archaeologically, artifact distributions at all of these seasonal settlements should reflect a balance between female and male activities, such as demonstrated for the Walker-Hooper and Bornick sites. The hunting of bison in general and the classic Winnebago economic pattern are probably fairly recent phenomena in eastern Wisconsin (Gibbon 1972). The analogy between the Grand River phase and the early historic Menomini economic and settlement system is only suggestive at best, for there is at present no archaeological evidence for extensive prehistoric utilization of wild rice by Oenota peoples in Wisconsin, nor is there a sufficient number of sites excavated to firmly establish a well-documented economic cycle.

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-------, and E.G. Bruder. 1955. Salvage Operations at the Kolterman Mound Group, Dodge County. THE WISCONSIN ARCHEOLOGIST 36 (No. 1): 3-12.

Plate 1. Lip Decoration Technique - Class II
A. reed punctate; B. narrow tool-impression, oblique; C. finger or broad tool-impression; D. fingertip punctate; E. miscellaneous punctate, blunt end; F. nodes; G. long ellipses. (right lip in A 5 cm in length)

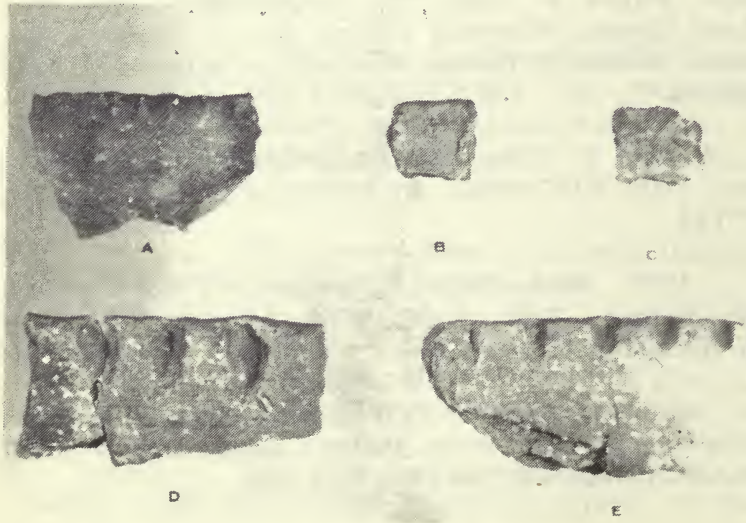


Plate 2. Lip Exterior Decoration Technique - Class IX
A. elliptical tool-impressions; B. ovoid fingertip impressions; C. circular punctations; D. finger or broad tool-impressions, variant; E. finger or broad tool-impressions. (lip in A 5 cm in length)

Plate 3. Shoulder Design Elements - 1 to 4
A. element 1; B. element 2; C. element 3; D. element 4.

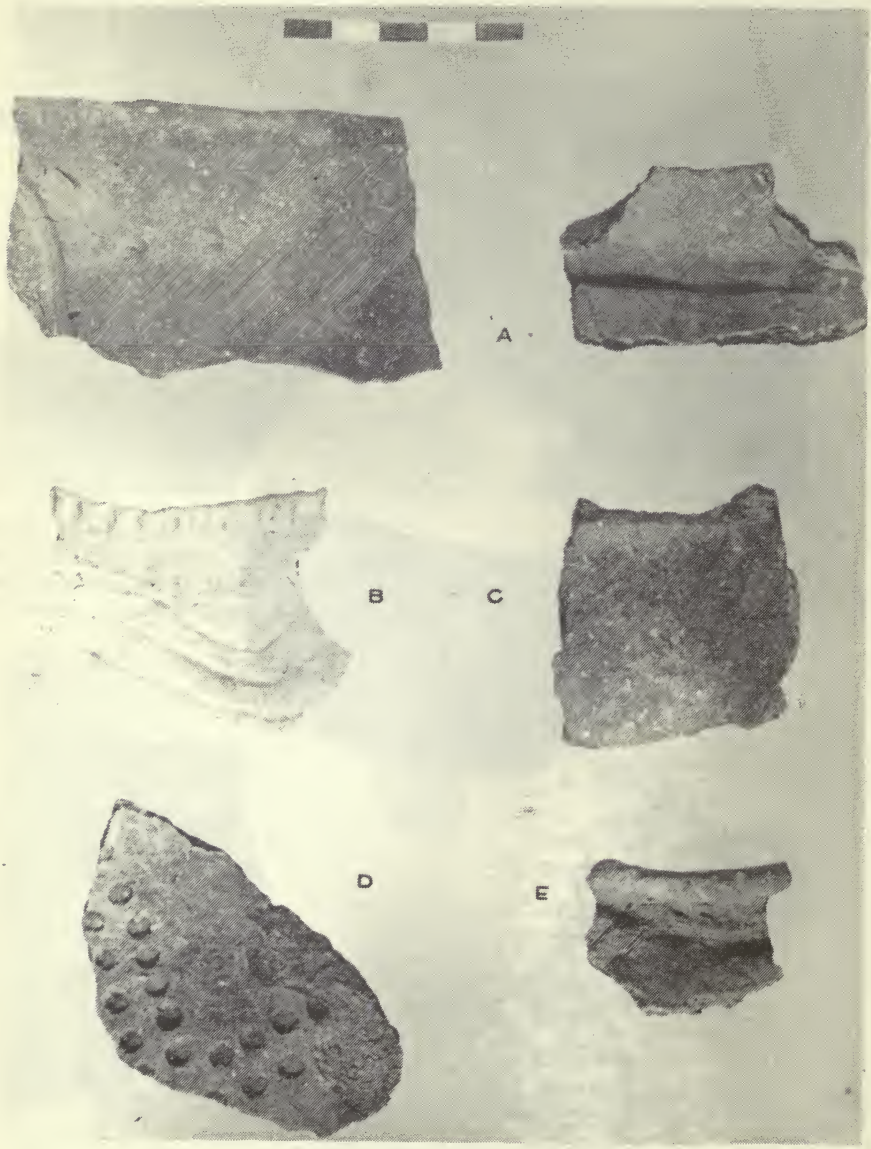


Plate 4. Shoulder Design Elements - 5 to 7, 9, 10
A. element 5; B. element 6; C. element 7; D. element 9; E. element 10.

Plate 5. Shoulder Design Element 11.

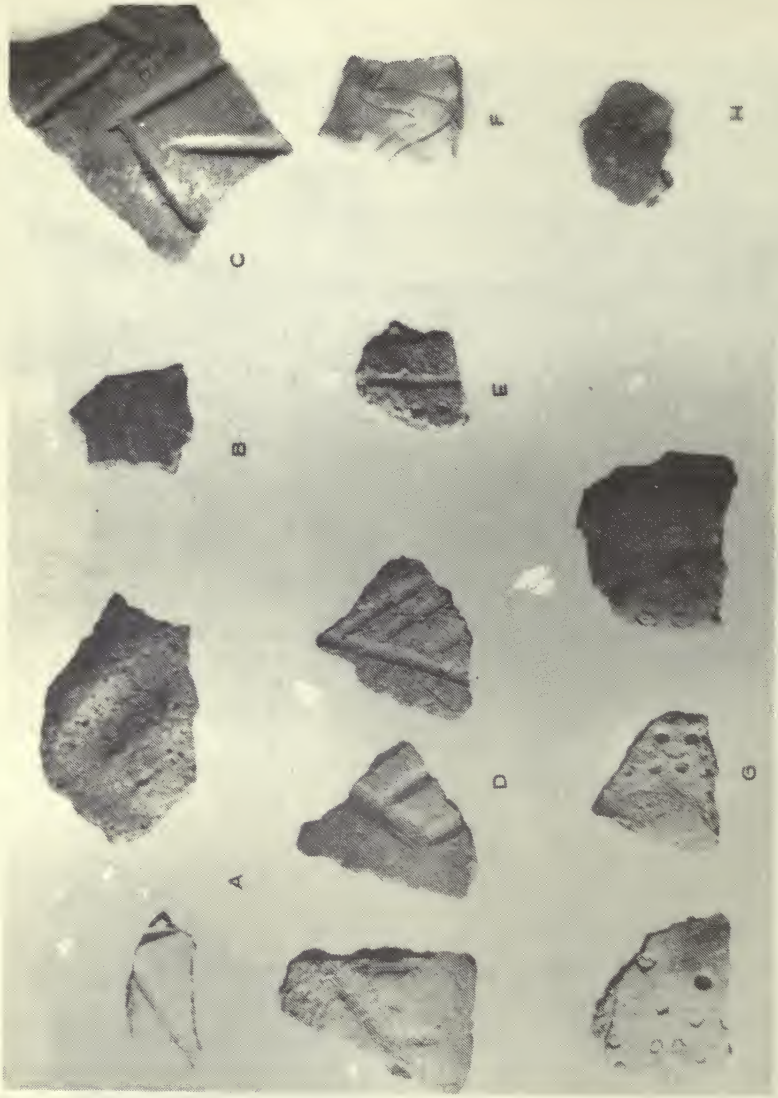


Plate 6. Sherd Design Elements from the Walker-Hooper site

A. chevron pattern (element 3)
B. two or more curvilinear trailed lines (element 6)
C. chevron pattern (element 3) (sherd 5 cm wide)
D. diagonal trailed line with attached vertical trailed lines (element 8)
E. trailed line with bordering punctates or tool-impressions (element 9)
F. curvilinear pattern (element 12)
G. two or more punctates or tool-impressions (element 10)
H. criss-cross pattern (element 11)

Figure 11. Rim Profile 1

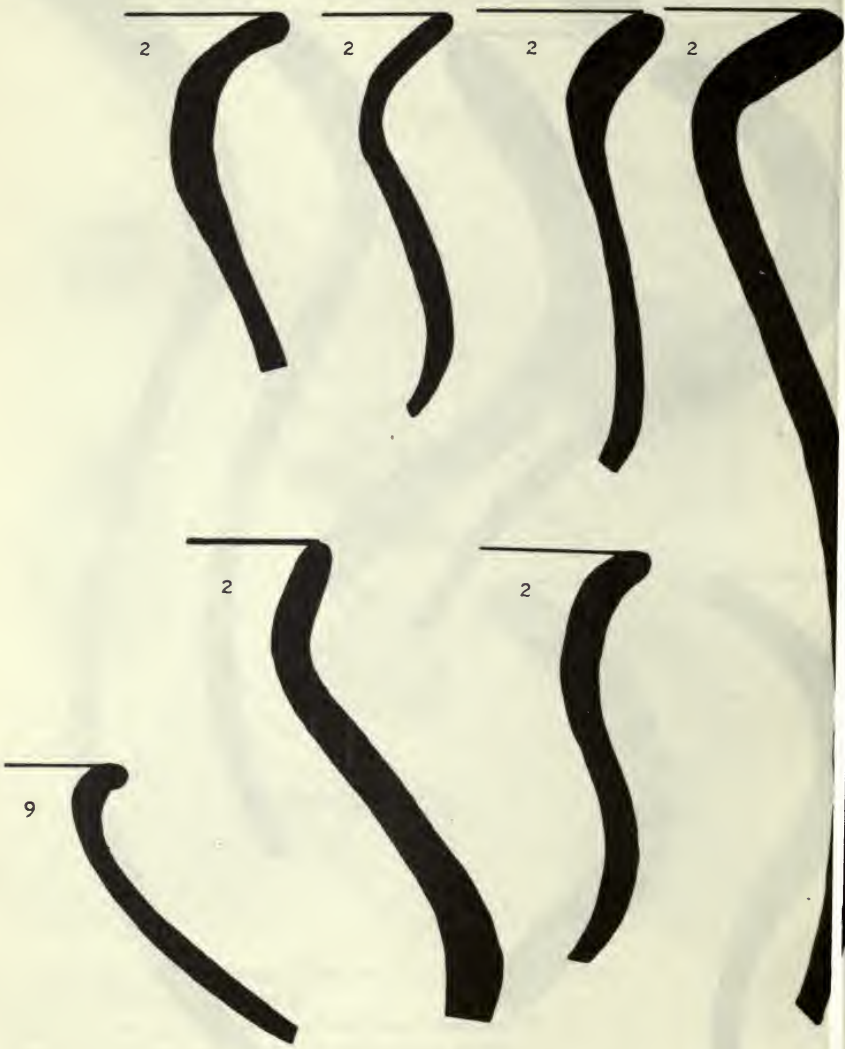


Figure 12. Rim Profiles 2 and 9 (profile at left top 6.8 cm. in length)

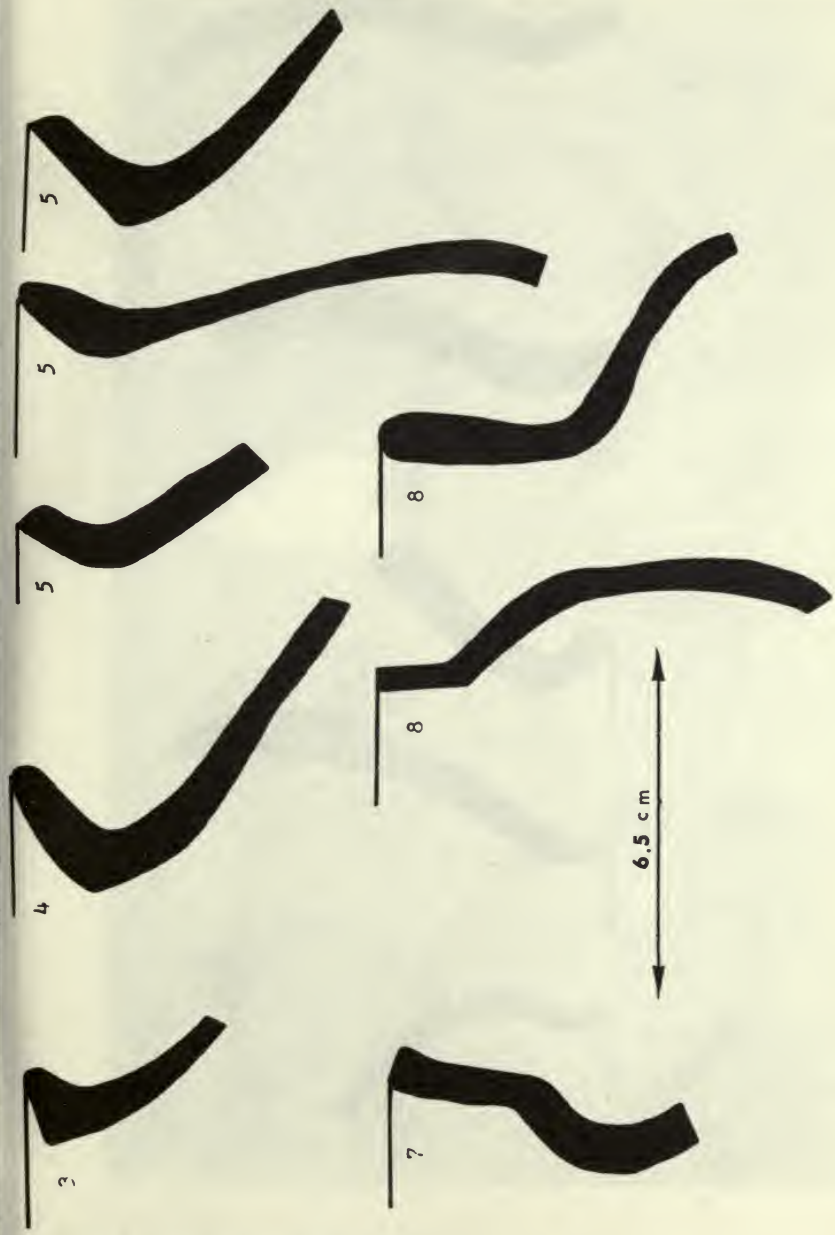


Figure 13. Rim Profiles 3 to 5, 7, 8

Figure 14. Rim Profile 6 (right profile 8.8 cm in length)

Plate 7. Oxidized Miniature Vessels

A-D. large vessel fragments; E-F. decorated sherds; G. little tri-pod vessel (F37-1); H. loop handles (l to r: F37-3, H77, H89) (rim in B 5 cm in length)

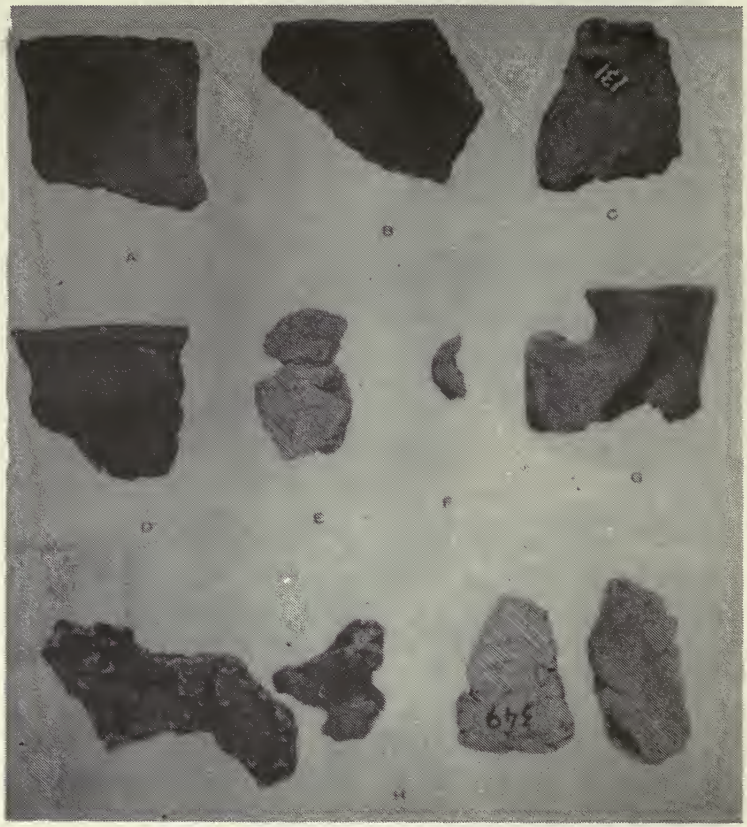


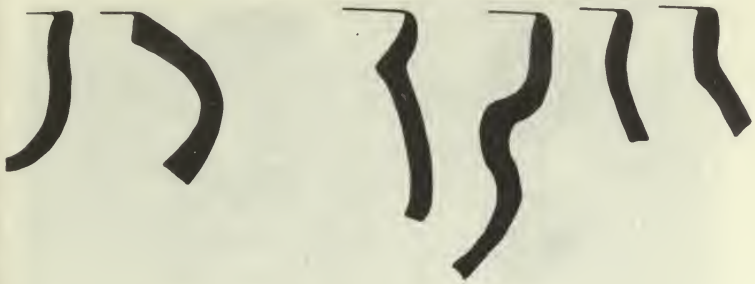
Plate 8. Miscellaneous Ceramics

A-C. grit-tempered Oneota ceramics (A. F51-1, G. F59-1, C. H56)
D. black wash on vessel shoulder
E. clay ladle (F69-1)
F. ear spool or labret fragment (F37-3)
G. pipe (U38-1 and F34-NV)
H. ceramic waste
(rim in B 5 cm in maximum length)

Figure 15. Profiles of Oxidized Miniature Vessels (right profile on bottom 5 cm in length) (top row left to right: F23-NV, F37-3, F46-1, F75-NV, F58-2 and 3, F48-4, F37-2; bottom row left to right: F37-1, H61, U11-1, U45-1, U44-1, U85-1, U41-1, U40-2)

Plate 9. Category 2 Miniature Jars and Bowls

A. jar from plow zone (profile illustrated in fig. 16, right in B);
B. bowl base from F38-39 overlap (illustrates sharp stick punctations);
C. jar from F37-3 (large intaglio, shoulder design 17;
D. jar from U85-1 second from right in B, fig. 16;
E. jar body from U11-1;
F. jar from F38-1 (shoulder design 18);
G. jar from F6-4.



ure 16. Profiles of Category Two Minature Jars
A. bowls; B. jars.
(A-left: H83, right: U85-2; B-left to right: F37-3, F48-4, F38-1, surface)
(left profile in B 4.2 cm in length)

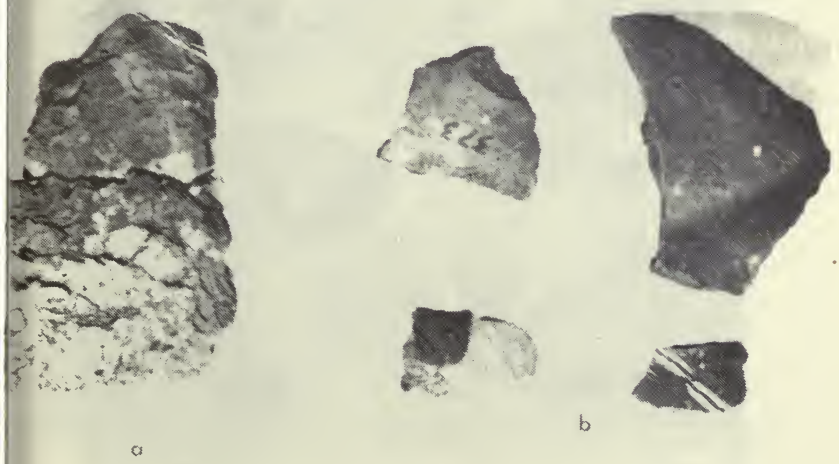
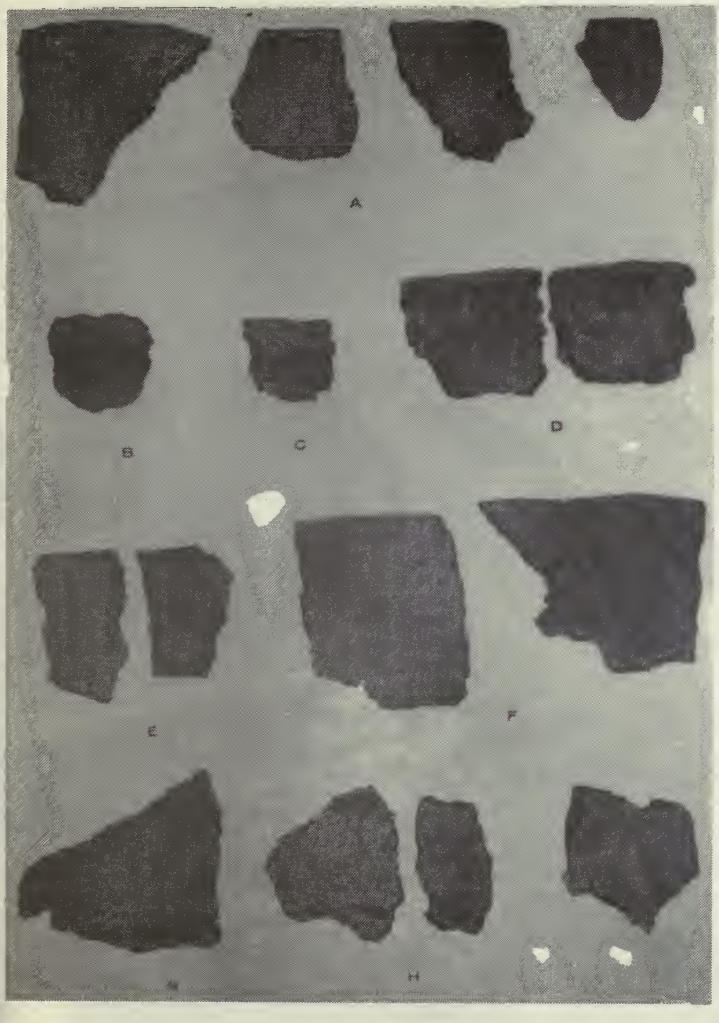


Plate 10. Daub and Painted Sherds (A is 9.1 cm in length)

Plate 11. Miscellaneous Ceramics

A. patch on exterior of rim (U50-1) (5 cm in length)
B. example of patch exposed (U67-1)
C. pottery discs
D. pottery lug (U48-1)
E. loop handles
F. strap handles



e 12. Woodland Ceramics from the Walker-Hooper site
. MADISON PLAIN; B. unclassified (U38-1); C. POINT SAUBLE COL-
ARED (H76); D. unclassified (U60-1 and 2); E. unclassified (F37-3, U78-4);
. MADISON CORD-IMPRESSED; G. Rocker Stamping (F44-NV); H. Incised
ver-Cordmarked (U63-2, F45-1); I. Stamped Sherd (F45-1). (lip of right rim
F 5 cm in length)

Plate 13. A. Bipolar Flakes; B. Bipolar Cores; C. Wedges; D. Flake I
E. Flake Gravers; F. Perforators.

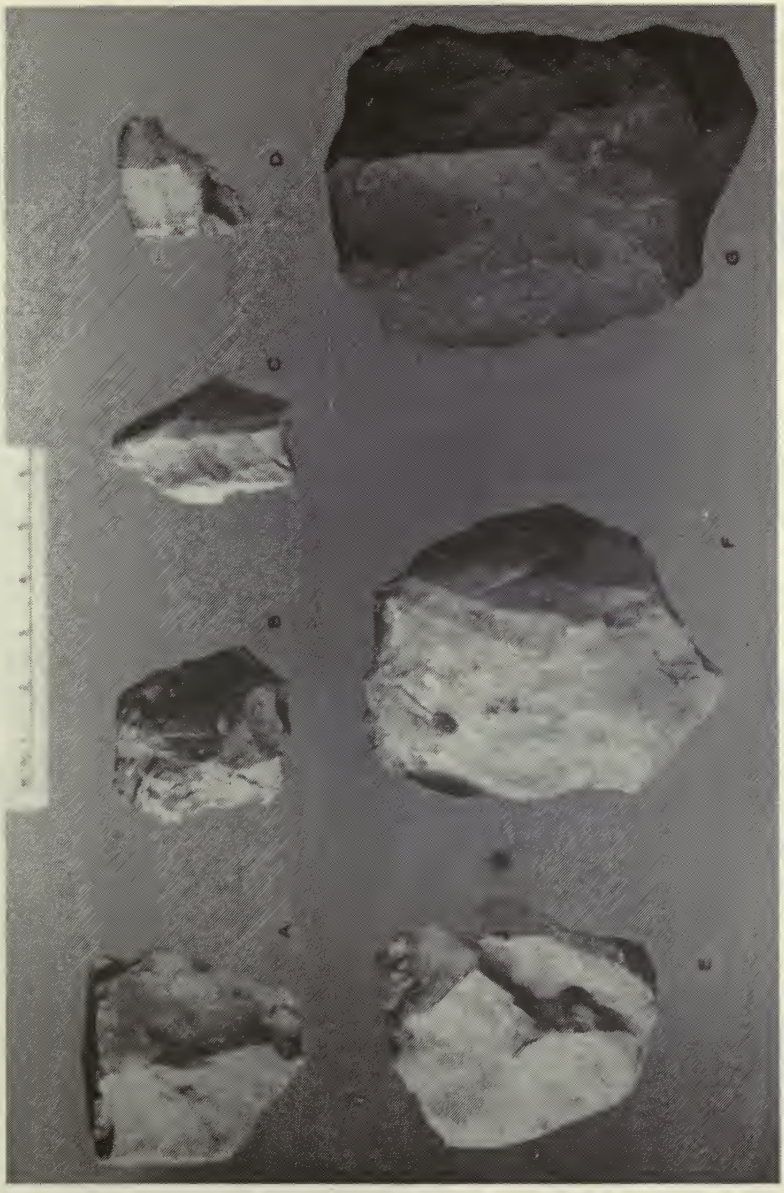


Plate 14. Non-bipolar Cores
(A. U54-1, B. surface, C. U28-1, D. U45-46, level 2, E. surface, F. surface, G. surface)

Plate 15. Retouched Flakes

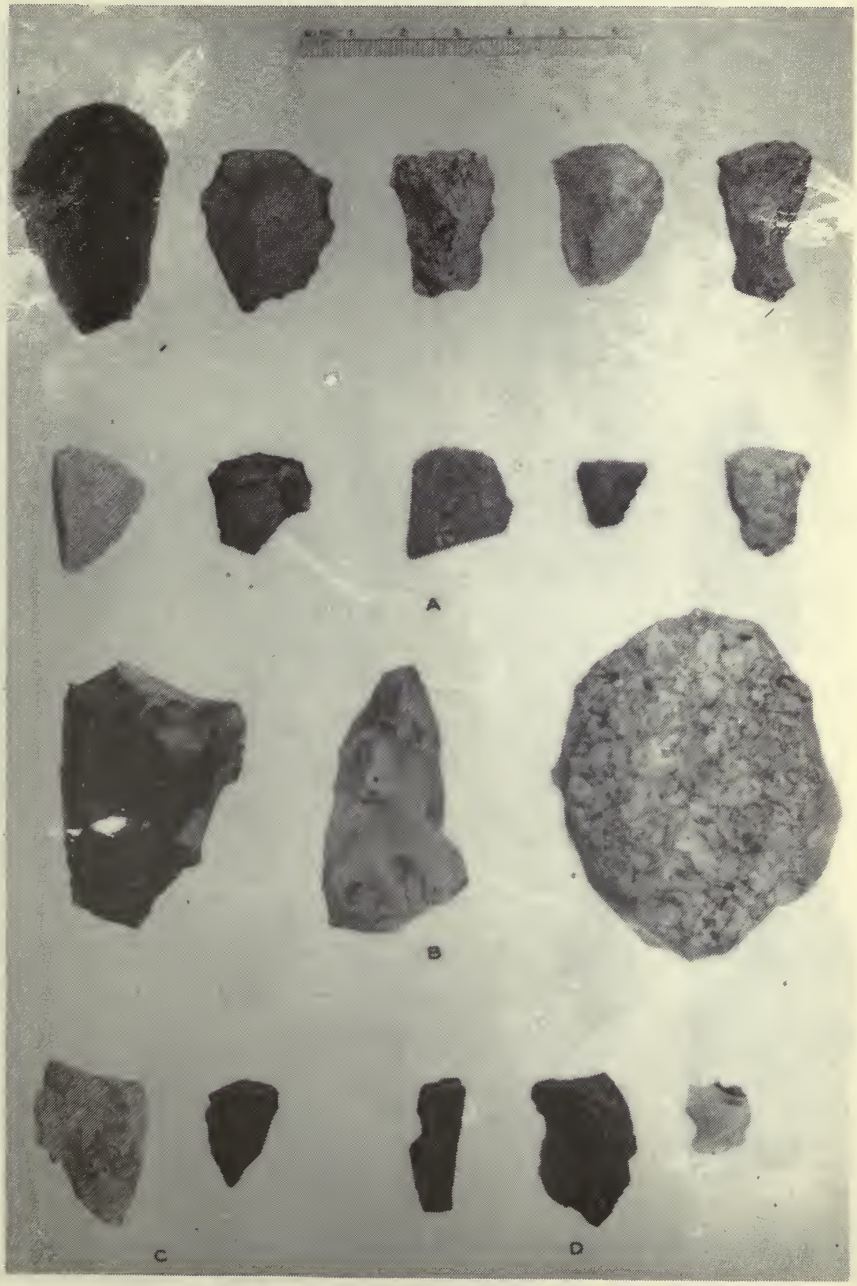


Plate 16. A. End Scrapers; B. Side Scrapers; C. Gouges; D. Notched Flakes

Plate 17. Knives from the Walker-Hooper site

Plate 18. Adzes from the Walker-Hooper site

Plate 19.

A. Flakes with Natural Point Used
B. Chipped Pebble (U38-1)
C. Pottery Polisher (F6-NV)
D. Limestone Ball (U26-1)
E. Basalt Disc (surface)
F. Blank (U24-1)
G. Celt (F58-5)

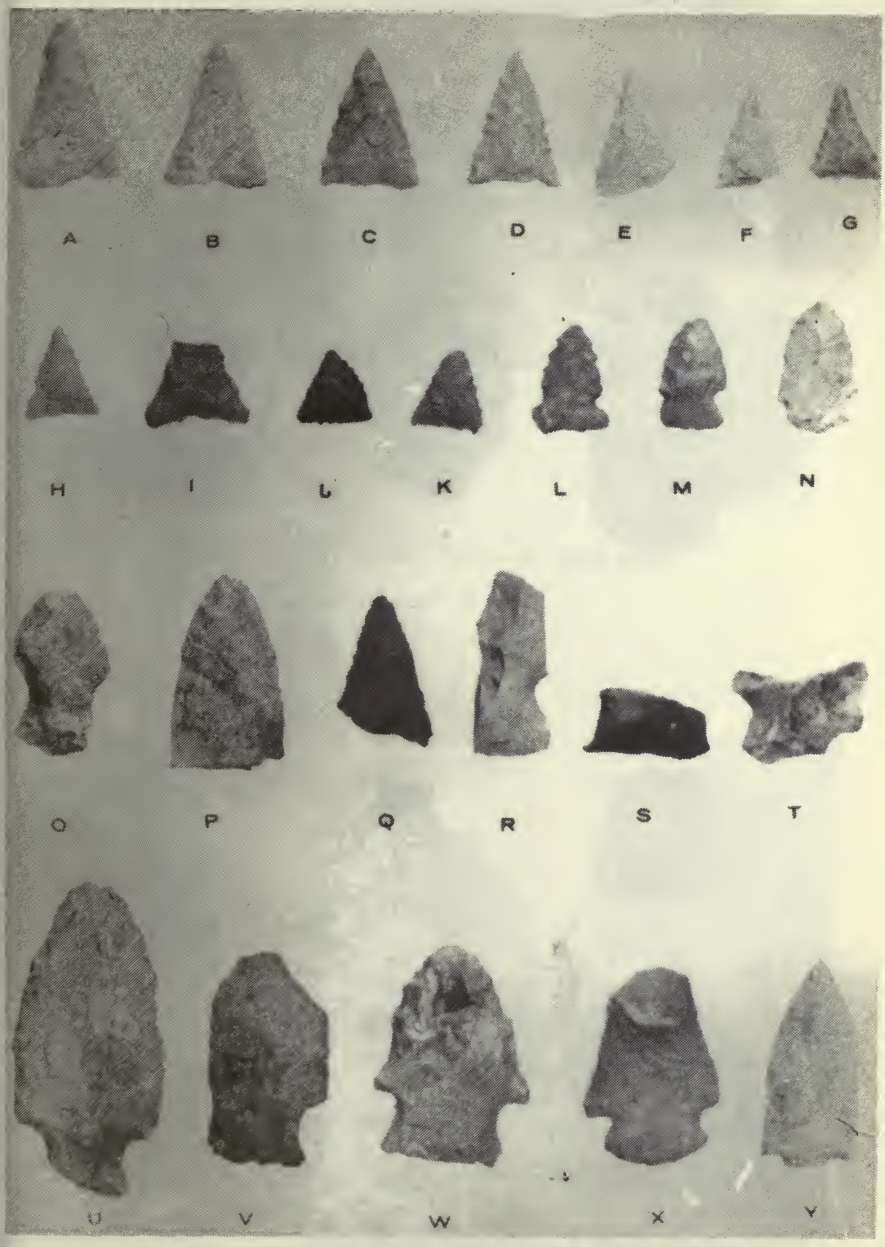


Plate 20. Projectile Points
A-K. unnotched triangular points; L-M. notched triangular points; N-Y. stemmed and notched points. (O is 16.5 mm. in length)

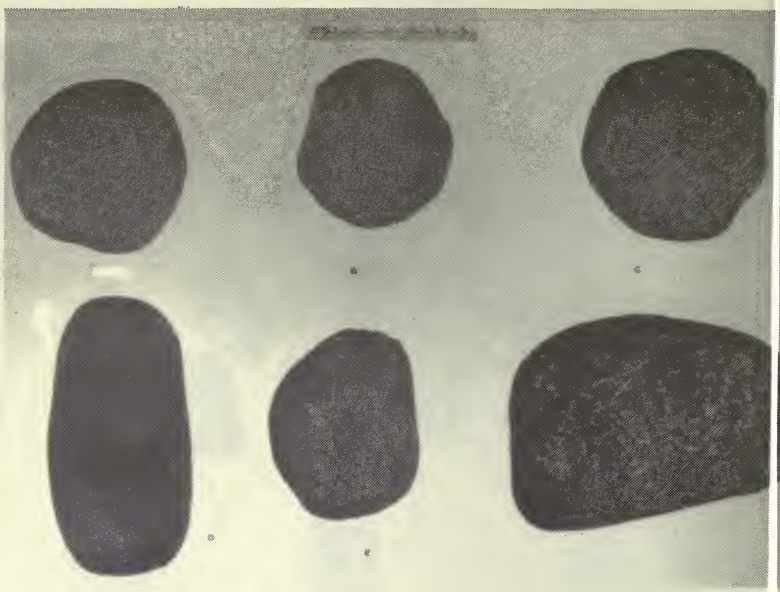


Plate 21. Hammerstones
A-C. spherical; D-F. other.

Plate 22. A-D. Abrading Stones; E. Pecked Stone; F. Mano Fragmer

Plate 23. A-C. Grinding Stones; D. Paint Stone

Plate 24. Stone Hoes

Plate 25. Copper and Slate Artifacts from the Walker-Hooper site

Plate 26. Deer Jaw Sickles and Bone Awls (b is 12.2 cm in length)

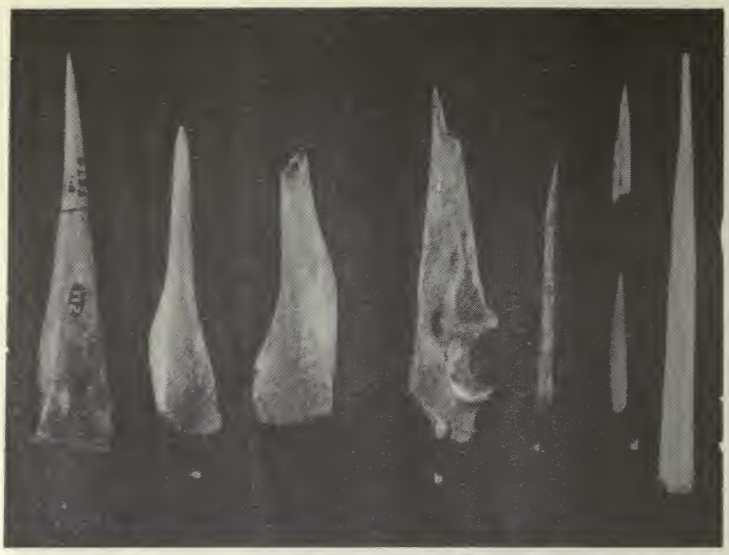


Plate 27. Bone Awls (b is 11.4 cm in length)

Plate 28. Bone Artifacts (a is 8 cm in length)

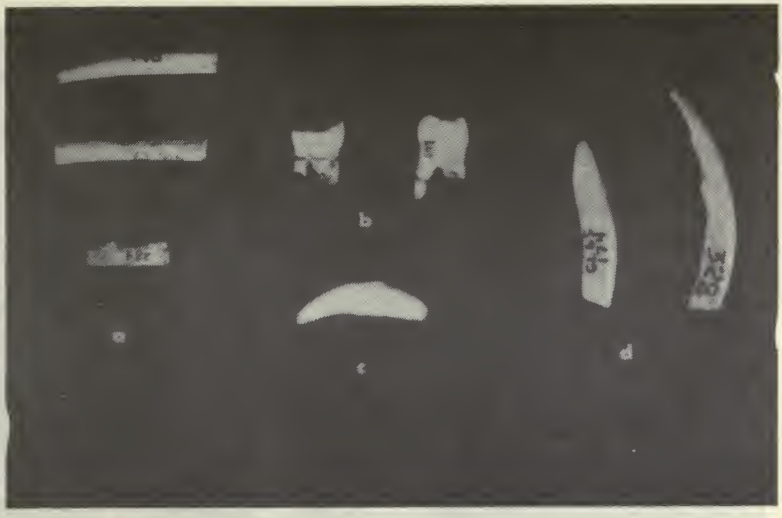


Plate 29. Beaver Teeth Incisors, Tooth Pendants and Bird Bone Tubes (top tube in a is 3.6 cm in length)

Plate 30. Antler Projectile Points and Detached Tines (top right point in b is 2.8 cm in length)

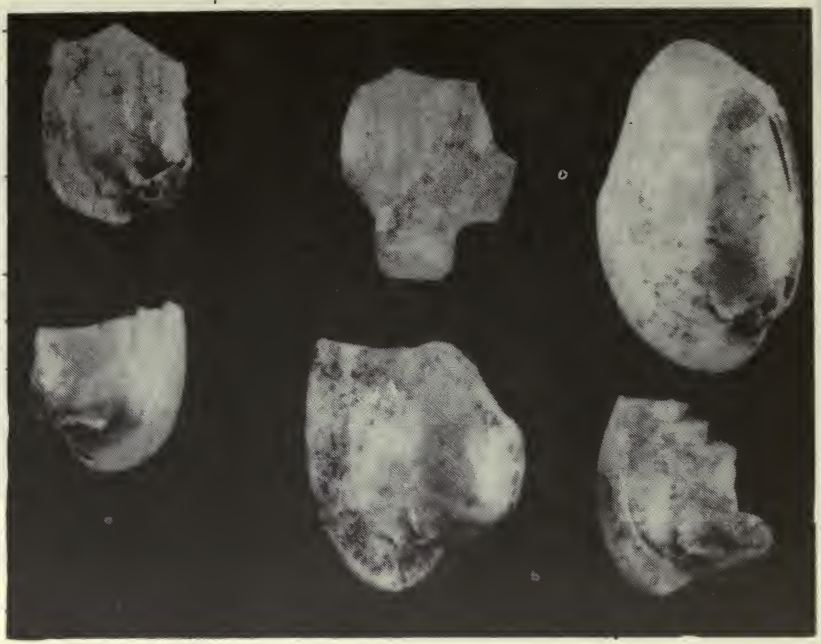


Plate 31. Shell Spoons and Scrapers
(top left spoon in b is 5 cm in length)

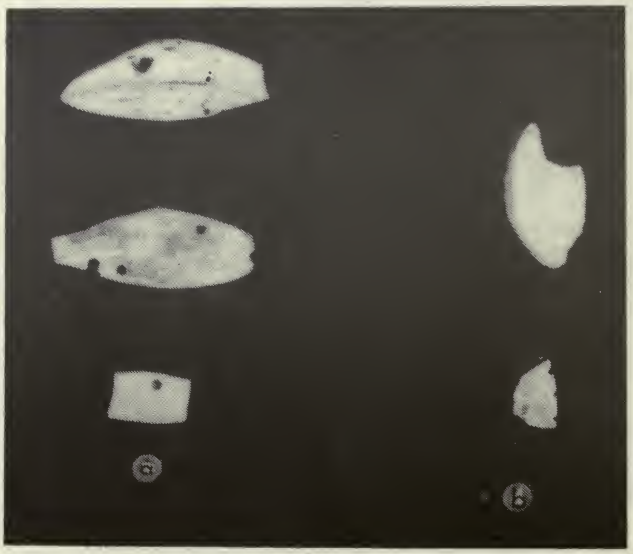


Plate 32. Shell Fish Lures and Miscellaneous Worked Shell
(top lure in a is 4.8 cm in length)

BOOK REVIEW

OSTER OF EXCAVATED PREHISTORIC SITES IN MIN-ESOTA TO 1972 by Jan E. Streiff. Minnesota Historical ociety, St. Paul. 1972. 38 pp. $2.50.

The ROSTER . . .is a list of excavated prehistoric rchaeological sites in Minnesota that has been updated om the 1967 ROSTER OF EXCAVATED PREHISTORIC ITES IN MINNESOTA by Carla Norquist. It is billed as a ompletely revised and corrected edition, and a spot omparison showed that a number of corrections have been ade, but the errors that are inevitable in any publication till exist (i.e. the reference to Johnson 1972 in the "Report" ection of 21-TR-2 is unclear).

This new edition, which is incidentally number seven in e Minnesota Prehistoric Archaeology Series, has added a hronology of prehistoric cultural traditions in Minnesota . viii) and a list of radiocarbon (C-14) dates from a umber of Minnesota sites (pp. 33-34). In addition, sites at were tested but not fully excavated have been dropped rom the ROSTER . . . . Consequently the 1972 roster as eliminated 28 sites that were previously listed and added 7 new ones excavated since 1966. The change leaves a final ist of 182 excavated sites. The "bibliography" has been hanged to "references cited" and has also been revised. ifty-three old references were dropped and 35 new ones dded bringing the total number of references to 142.

Miss Streiff's job of reorganization appears compre-ensive and up-to-date, so it is strange that she failed to ist the most publicized of Minnesota's 1971 excavations--he Fort Sweeney excavation (21-GD-86) which was inter-upted by Indian protestors. Was it an oversight in research, r a "politcally" motivated deletion?

All in all the work appears quite accurate, but I still uestion the need for it, especially as a second number in he Minnesota Prehistoric Archaeology Series. I know a umber of people who were getting along quite well with the ld edition and since 54 of the 142 "references cited" were isted as being unpublished, it seems that the Minnesota istorical Society could put its money and publications to etter use.

Jon T. Erickson
Milwaukee Public Museum

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1. Date of filing: September 20, 1972
2. Title of Publication: The Wisconsin Archeologist
3. Frequency of issue: Quarterly
4. Location of known office of publication: Leader Printing Company, Lake Mills, WI. 53551
5. Location of the headquarters or general business offices of the publishers: Milwaukee Public Museum, 800 W. Wells St., Milwaukee, WI. 53233
6. Names and addresses of publisher, editor and managing editor: The Wisconsin Archeological Society, Milwaukee Public Museum; Robert Ritzenthaler, Milwaukee Public Museum
7. Owner: The Wisconsin Archeological Society, Milwaukee Public Museum, Milwaukee, WI.
8. Known bond holders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None
9. For completion by nonprofit organizations authorized to mail at special rates: Have not changed during preceding 12 months
10. Extent and nature of circulation: Membership

	Av. No. Copies each issue during preceding 12 mo.	Actual no. of copies of single issue published nearest to filing date
A. Total No. Copies Printed	750	750
B. Paid Circulation		
Mail Subscriptions	450	475
C. Total Paid Circulation	463	475
D. Free Distribution	None	None
E. Total Distribution	463	475
F. Office Use, Left-Over, Unaccounted, Spoiled after Printing	287	275
G. Total	750	750

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March 1973 Volume 54, Number 1
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THE WISCONSIN ARCHEOLOGIST

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by James B. Stoltman

ANIMAL RESOURCE UTILIZATION AT THE COOPER'S SHORE SITE (47RO2) ROCK COUNTY, WISCONSIN 36
by Lois K. Lippold

THE BOOKSHELF 63

THE PHOTO ALBUM 65

NEWS AND COMMENTS 66

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The Wisconsin Archeologist is published quarterly in March, June, September and December of each year by the Wisconsin Archeological Society. Printing is done by American Printing and Publishing Inc., 2909 Syene Road, Madison, Wisconsin, 53713. Subscription is by membership in the Wisconsin Archeological Society. Dues for annual membership are $5.50 for individuals and $8.00 for institutions. Membership requests should be addressed to the Treasurer and sent along with a check payable to the Wisconsin Archeological Society. Information concerning back issues is available from the Secretary.

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THE OVERHEAD SITE (47LC 20), AN ORR PHASE SITE NEAR LA CROSSE, WISCONSIN

James B. Stoltman
University of Wisconsin-Madison

ABSTRACT

Described are the findings of salvage excavations at a single-component Orr phase, Oneota tradition site near LaCrosse, Wisconsin. Despite the badly disturbed nature of the site, excavations revealed an apparent wigwam-like house with two internal pits. One of the pits proved to be a hearth, the other a storage pit that produced a probable bison scapula hoe and a nearly complete ceramic vessel. Two additional pits and their associated artifacts are presumed to have been coeval with the house. The house, an apparent single-family dwelling, is the first so far reported from the Orr phase in Wisconsin.

INTRODUCTION

The Overhead site is located within the alluvial valley of the Mississippi River about 3/4 mile south of the city limits of LaCrosse, Wisconsin. It is situated immediately adjacent to the roadbed of the Chicago, Burlington, and Quincy railroad tracks southwest of the point where a long viaduct, locally referred to as the Overhead, carries combined highways 14, 35, and 61 over the railroad tracks. More specifically, the site is situated in the S.W. ¼ of Section 22, T 15 N, R7W in the town of Shelby. A broad view of the site as seen from the overhead that gives the site its name is shown in Figure 1.

FIGURE 1
View of the Site Looking Southward
from the Highway 14-35-61 Overhead

The site was called to my attention by Dr. Sheldon Smith of the Department of Anthropology, UW-LaCrosse, in the middle of the summer of 1971. He had heard reports of pottery and other artifacts being found in the area we are here calling the Overhead site while that area was being cleared by bulldozers in preparation for a new housing development. Alarmed at the destruction of an archaeological site and hopeful that some information could still be salvaged from it before construction made it completely inaccessible, Dr. Smith, an ethnologist by training, contacted the UW-Madison anthropology department in hopes of interesting a trained archaeologist to visit the site. It was thus through the conscientiousness of Dr. Smith, who was unwilling simply to stand

by and watch another of Wisconsin's non-renewable archaeological resources be destroyed without so much as a record being kept, that 14 undergraduate student volunteers, Mr. Bruce Lutz (then a visiting lecturer in anthropology at UW-Madison), and I set out from Madison for LaCrosse on the morning of August 13, 1971.

As can be seen in Figure 1, the view of the Overhead site that greeted us was not exactly encouraging. Recent rains had rendered the soil soggy, and what was far worse, the bulldozers had removed a substantial though undetermined amount of topsoil (perhaps as much as 1 foot), depositing it in a jumbled mass near the periphery of the site. The surface exposed by the bulldozers was surprisingly sparing of artifacts. Even the soil redeposited by the bulldozers was largely devoid of artifacts. So our initial surface survey of the site left us little reason for optimism. Our subsequent excavations proved, however, that initial impressions can be misleading, for within the brief span of less than two full working days, our test excavations had exposed 2 hearths, 2 pits, a house (as revealed by a series of post molds), a bison scapula hoe, and a number of lithic and ceramic artifacts, including well over half of a pottery vessel, all of which appear to date to a single Orr phase occupation of the site.

EXCAVATIONS

Our first step in commencing work at the site was to lay down a 600 foot long, north-south base line roughly bisecting the site (Figure 2). This baseline served as the basis for establishing the horizontal coordinates of any artifacts or features recovered during our subsequent work. Our next step was to search carefully the surface of the site left exposed by the bulldozers for artifacts or any other signs of human habitation.

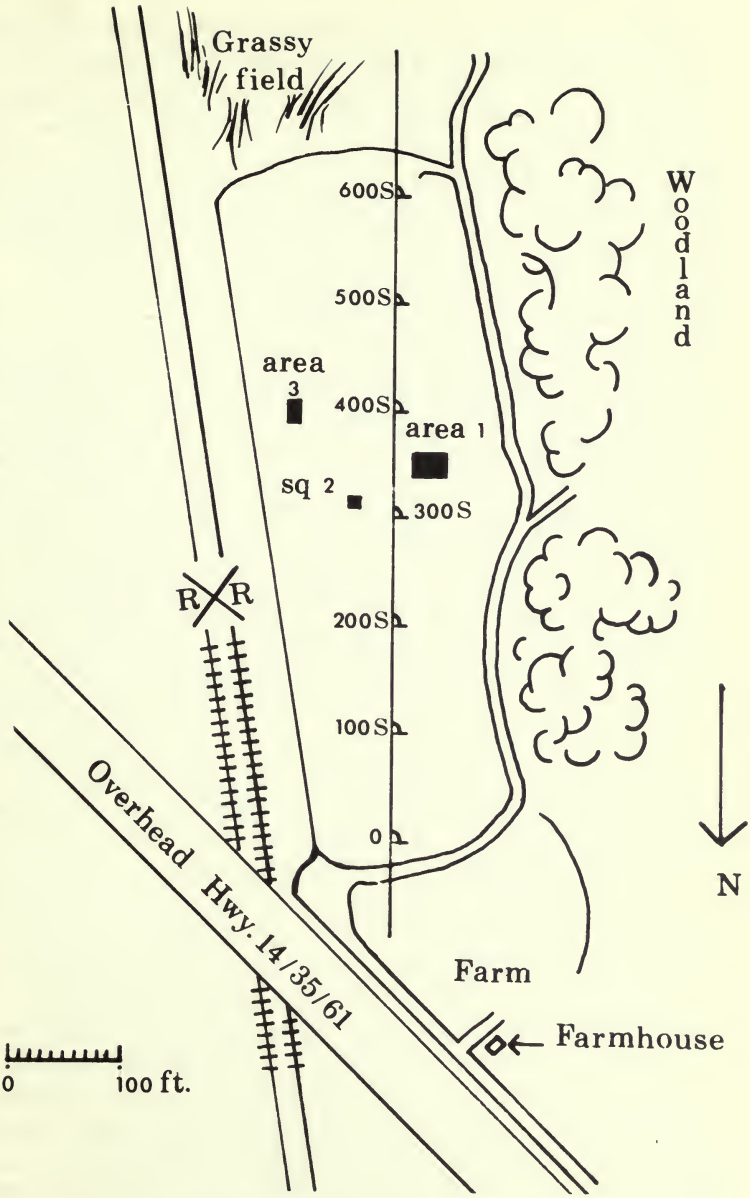

FIGURE 2
Sketch Map of the Overhead Site Showing Its Location Relative to the Railroad Tracks And the Highway 14-35-61 Overhead and Showing Excavated Areas

As noted above, our surface survey produced almost no artifacts, but two concentrations of fire-cracked rocks scattered by the bulldozers immediately attracted our attention. These were found in Area 1 and in Square 2 (Fig. 2). For this reason, we staked out a 10 foot square in each area and commenced excavations via shovelling the soil into sifters with $\frac{1}{4}$ inch mesh screen. As work progressed in our first 10 foot square (in the northwest corner of Area 1), we encountered post molds almost immediately. It was in following out the various alignments of these post molds that our original Square 1 was expanded into a 20 by 30 foot block designated as Area 1. Meanwhile, surface finds of a concentration of over 20 chert flakes in the vicinity of Area 3 led us to begin excavations there. The original 10 foot square here was ultimately expanded by adding a second 10 foot square immediately to the south. In sum it can be seen that we exposed a total area of 900 square feet. Our general excavations penetrated, on the average, to a depth of 6 inches, but of course it must be remembered that this work commenced not on a natural surface but on an arbitrary surface of unknown depth beneath the level of original human occupation.

Our initial strategy was to skim off thin slices of soil with shovels to expose any possible features while at the same time sifting all excavated soil. The artifact yield from the sifters proved so sparse, however, that we soon abandoned the sifting of the general fill. Instead, we simply made periodic checks of the backdirt piles for any artifacts that may have been missed during the skimming operations. When features were encountered, the shovels were abandoned and the features were exposed by careful troweling after which drawings were made and photographs were taken. Bulk soil samples were then collected from each feature for return to the UW-Madison laboratories for processing by

water screening and flotation of the contents. The portions of the features not collected in polyethelene bags were then carefully trowelled into ¼ inch mesh sifters. Virtually all of the ceramic, stone, and bone artifacts recovered by us from the site were obtained from the features in this manner.

FINDINGS

Features

A total of 4 features were numbered in the field, one each from Square 2 and Area 3 and two from Area 1. In addition a cluster of 19 post molds in no obvious pattern in the vicinity of Feature 3 (in Area 3) and another cluster of 64 post molds around Features 2 and 4 in Area 1 (Fig. 3) were exposed. The latter cluster of post molds in Area 1 clearly reflects a generally oval pattern and is here considered a definite house. The house and each of the 4 features are discussed in turn below.

The House.

An assemblage of 64 post molds arrayed in a generally oval pattern within Area 1 represents the sole surviving remnants of what formerly must have been a pole framework for a dwelling (Figs. 3 and 4). Judging from the uniformity of the post mold sizes (5 to 6 inch diameters), the primary framework of the house had been constructed out of saplings averaging 3 inches in diameter. No evidence was found that would provide a clue as to what covered the pole framework. Fired clay daub was completely lacking both from our surface collected and excavated samples. It is likely that the framework was covered with perishable materials such as reed mats or possibly with bark or skins. The interior of the house was largely devoid of posts, although an east-west alignment of post molds roughly bisecting the house might be interpreted as evidence for an

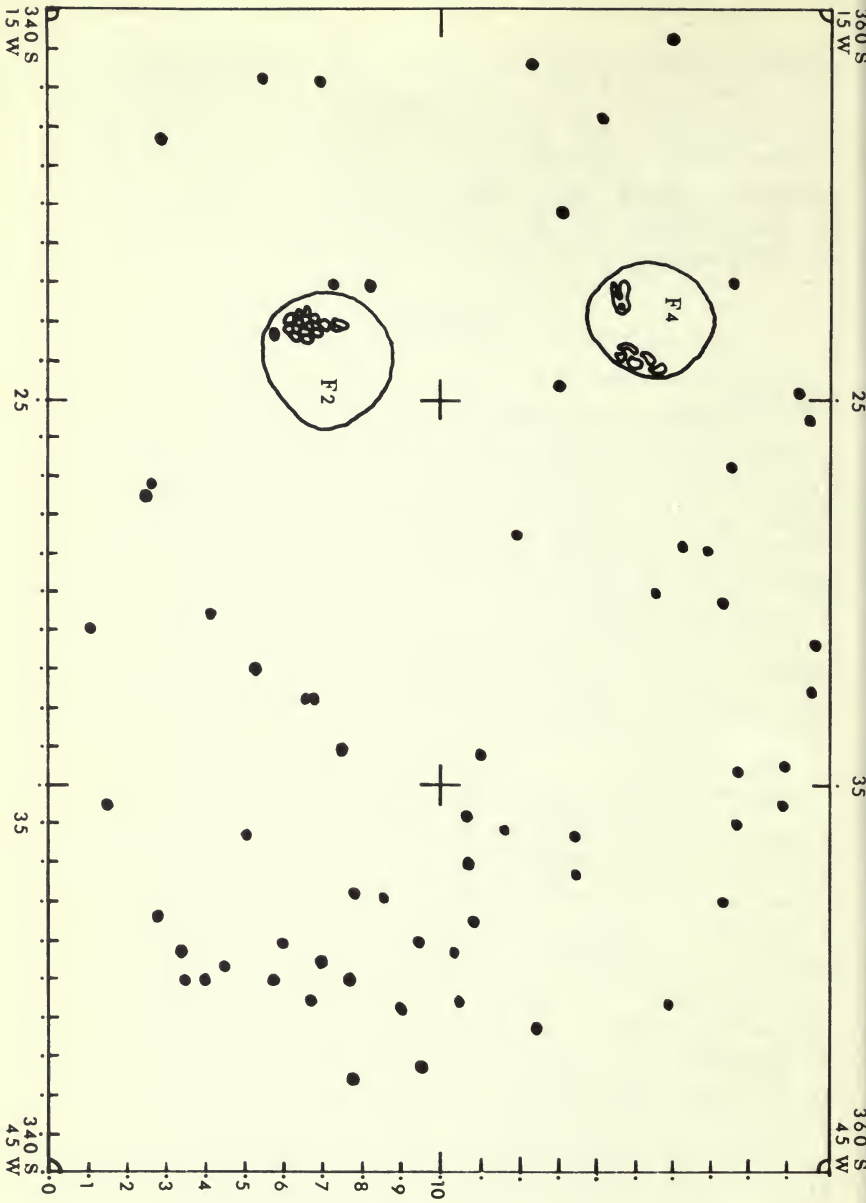

FIGURE 3
Plan of Area 1 Showing the Locations of the Post Molds of an Oval Structure with Two Interior Pits, Features 2 and 4. Note north is at the bottom of the figure.

internal partition.

The cluster of post molds along the northwest edge of the house are suggestive of a special sub-structure. At least three possible interpretations of the function of this sub-structure come to mind: (1) it may have served as a sheltered entryway, (2) it may have been a kind of shed or storage rack attached to the exterior of the house, or (3) it may have been a storage or sleeping platform inside of the house. Considering ethnographic analogies from the general western Great Lakes region (Ritzenthaler and Ritzenthaler 1970:60-61) and from the Ioway in particular, who are widely considered to be the historic descendants of the Orr phase (Wedel 1959:39; Skinner 1926:277), an internal bench or platform is perhaps the most likely interpretation of this sub-structure.

No conclusive evidence of a door was found, although at least three gaps between posts along the periphery of the house are suggestive of entrances. If the cluster of post molds along the northwest side of the house is interpreted as a sheltered entryway, then it might be inferred that access to the house was from the north into the entry passage leading to a doorway near the center of the west wall at about 349 South, 35 West (Fig. 3). A 9 foot gap on the north side of the house centering on a point 343 South, 22 West (Fig. 3) is also a likely candidate for a door, as is the 5.5 foot gap in the center of the east wall. Considering the advantages of an east-facing entrance—maximal exposure to the warming morning sun and minimal exposure to the westerly winds that bring most of the inclement weather to this area—the east-facing entrance seems most likely. It must be admitted, however, that multiple entrances are also possible.

No evidence of the house floor, either in visible changes in soil color, texture, or compaction or in the presence of artifacts and other

refuse, was encountered. Apparently the bulldozers had completely obliterated the house floor prior to our excavations.

Assuming that all of the post molds belong to a single structure (We carefully searched all of Area 1 for evidence of other post molds and found none.), the maximal dimensions of the house are 25 feet east-west by 18 feet north-south. The maximal floor area of the house may thus be estimated at about 380 square feet or approximately 35 square meters. Based upon data compiled from 18 ethnographic accounts and reasoning from analogy, Naroll (1962) has proposed that population sizes for prehistoric sites can be roughly estimated at one-tenth of the floor area in square meters per person. If we accept these figures as at least broadly valid (as, for example, Hole and Heizer 1969:307 have done in their influential book), the number of people who occupied the Overhead house can be estimated at about three to four. While these figures should be regarded as only the roughest of estimates, they nonetheless support the impression gained from the general size of the structure and the presence of a single hearth (Feature 4) that the house probably served as a single nuclear family dwelling.

This house is the first to be reported from an Orr phase context in Wisconsin. No houses have yet been reported from Orr phase sites in either Iowa or Minnesota (e.g. Wedel 1959:42, 123), although Dr. Marshall McKusick has recently exposed a series of rectangular longhouses at the Grant site, a pre-Orr phase Oneota site in the Upper Iowa river valley in northeastern Iowa, that are soon to be published.

Elsewhere in Wisconsin, houses have been reported from Oneota tradition contexts at Carcajou Point (Hall 1962:17-21) and at the Walker-Hooper site (Gibbon 1969:51-53). At the former site 3 house types were recognized: an apparently oval wigwam-like structure; a rectangular, probably

FIGURE 4
Post Molds from the Partially Exposed House in Area 1

FIGURE 5
Excavations in Progress in Feature 2; Feature 4, Still Unexcavated, Visible Just Behind the Two Seated Students

gabled house; and a rectangular wall trench structure. The presumed wigwam is the most poorly defined house type at Carcajou Point, consisting only of a series of not-so-clearly aligned post molds with no evidence of a floor or of any associated artifacts. At the Walker-Hooper site Gibbon found two oval alignments of post molds suggestive of wigwam-like structures. The larger measured 31 feet by 10 feet, while the smaller measured 20 feet by 11 feet. Both houses had clearly delimited tramped floors and a number of associated pits including a large fire pit or hearth near one end. As with the Overhead house, those from the Walker-Hooper site might reasonably be inferred to have served as single nuclear family dwellings.

Feature 2

Feature 2, situated in Area 1 within the confines of the house walls (Fig. 3), is regarded as a hearth. As noted above, we were initially attracted to this area of the site because of a surface scattering of fire-cracked rocks produced by the bulldozers. Our subsequent excavations revealed that the source of these rocks was a definite pit, which was thus designated Feature 2. Because the upper portions of Feature 2 had been extensively disturbed by the bulldozers, it was impossible to ascertain the original shape of the pit or its level of origin. At the time we first recognized the feature it was a basin-shaped depression about 8 inches deep with a 3.5 foot diameter. At least 12 fire-cracked rocks still *in situ* in the feature plus charred and calcined bone and fired stone artifacts prompted us to regard it as a hearth.

Besides fire-cracked rocks, Feature 2 produced the following items:

36 fish bones (some of which are definitely catfish)
13 turtle bones
73 bones of large mammals (all calcined)

20 bones of small mammals
37 shell-tempered potsherds (8 were assigned to one vessel, Vessel D, with the others possibly deriving from one or more additional vessels)
46 pieces of chipped stone
1 fragment of a sandstone abrader

All bones except the fish and 5 of the small mammal bones are too fragmentary to be identifiable to the species level. These identifications have not yet been completed. Description of the ceramic and lithic artifacts will be presented below after the other features have been discussed.

Feature 4

Feature 4, like Feature 2, is a basin-shaped pit situated within the house (Figs. 3 and 5). At the time of discovery it was roughly circular in outline with an average diameter of 3.1 feet and a depth of just under 1 foot. Because of the bulldozer disturbances, it was impossible to ascertain the original total depth of the pit.

Feature 4 has been interpreted as a storage pit. The absence of concentrations of ash or charcoal and the total absence of fire-cracked rock along with the apparent careful placement of the principal contents of the pit, a bison scapula hoe, most of a single ceramic vessel (Vessel A), and a granite cobble (Fig. 6), are the bases for this interpretation. Feature 4 might also be interpreted as a refuse pit, although the paucity of cultural debris randomly scattered within the pit tends to mitigate against this interpretation. Despite the fact that over 57 liters of soil from the feature were processed in the laboratory by flotation and water screening (the remainder of the pit fill was screened in the field), only a few charred seeds, tiny splinters of unidentifiable calcined bone, 13 pieces of chert debitage and ten shell tempered potsherds were recovered from the pit fill.

FIGURE 6
Feature 4 in the Process of Excavation; Granite Cobble, Ceramic Vessel (A), and Bison Scapula Hoe *in situ*

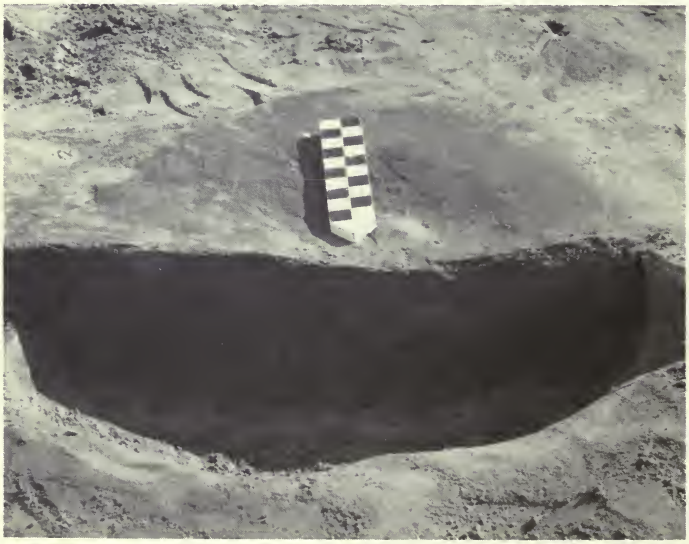

FIGURE 7
Feature 3 Sectioned and Partially Excavated

Enough small fragments of charcoal were also recovered from the pit fill via water screening to permit a radiocarbon date to be obtained: A. D. 1510 ± 65 years (WIS-573).

Feature 1

Feature 1 is classed as a hearth. It is located near the center of Square 2 (Fig. 1). As was the case with Feature 2, our attention was attracted to the vicinity of this feature by virtue of surface finds of fire-cracked rocks produced when the bulldozers had disturbed it. Also present in Square 2, unlike Area 1, was a surface scattering of badly fragmented mussel shells.

Our excavations in Square 2 soon revealed the source of the fire-cracked rocks and mussel shells to be a circular pit approximately one foot in diameter. Despite the bulldozer disturbances, a substantial concentration of fire-cracked rock remained *in situ* and was carefully excavated. At the time of our work less than one foot, vertically, of the pit remained. Besides fire-cracked rocks and additional fragments of shell, some of it intensively fired, Feature 1 yielded 46 shell tempered potsherds from 2 vessels (Vessels B and C). Interestingly, no stone artifacts or debitage were recovered from Feature 1, nor did we find any identifiable bone in the feature.

Other than the feature contents, the general excavations in Square 2 recovered 9 additional shell-tempered potsherds, one of which was definitely derived from Vessel C found in Feature 1, and 6 stone artifacts including a core, 2 retouched flakes, and 3 unutilized, unretouched flat flakes. It is likely that these artifacts were originally associated with Feature 1 before the bulldozer disturbances.

Feature 3

Feature 3, considered a probable refuse pit, is situated virtually dead center in Area 3, a 10 by 20 foot rectangular area near the eastern edge of the site (Fig. 1). Our attention was

drawn to this area of the site by surface finds of chert debitage, more of which was collected here by us than from the entire remainder of the site. By the time we had completed excavating the upper 6 inches of Area 3, we had recovered a total of 46 chert artifacts (42 pieces of debitage and 4 utilized flakes) and 18 unidentifiable fragments of calcined mammal bone as well as having exposed a cluster of 19 post molds (in no apparent pattern) along with the refuse (?) pit.

At the time of recognition Feature 3 was a clearly visible, basin-shaped depression with a horizontal diameter of 3 feet and a depth of 10 inches (Fig. 7). From this pit remnant (for we must assume that most of the pit had been destroyed by the bulldozers), we recovered five shell-tempered potsherds with most of the shell leached out (these represent at least 2 separate vessels), 14 chert artifacts (1 biface fragment, 4 utilized flakes, 9 pieces of debitage, and 1 hammerstone), four bone fragments from unidentified large mammals that disintegrated upon removal, and some fairly sizeable pieces of charcoal. A radiocarbon date run on these pieces of charcoal produced the following results: A.D. 1485 ± 55 years (WIS-601).

Assuming that the 46 chert fragments that were recovered from the general excavations of Area 3 were in fact directly related to the pit, perhaps even originally in the pit before displaced by the bulldozers, it might reasonably be inferred that the entire Area 3 assemblage constitutes the remnants of localized chert knapping activities. The fact that 50 of the 60 chert artifacts from Feature 3 and the surrounding area are unretouched and unutilized flakes and that none of the remaining artifacts except the biface fragment bear any evidence of intentional secondary retouch argues in support of this inference.

Artifacts

Excavations at the Overhead site produced a total of 256 potsherds, 120 stone artifacts, and 1 bone hoe. The distribution of these artifacts within the site is recorded in Tables 1 and 2. As can be seen from a glance at these tables, nearly all of the artifacts were recovered from the four features. The few remaining artifacts were recovered during general excavations in the three major areas. Since these latter artifacts had been recovered on or near an arbitrary surface that had been created by the bulldozers, there is every reason to believe that they had been displaced from their original positions. Thus these artifacts are treated as surface collections in Tables 1 and 2. It seems highly likely that most were derived from nearby features whose upper levels had been destroyed by bulldozing. Because of the typological homogeneity of the entire artifact sample, it is here treated as a single assemblage and assumed, along with the house and the four features, to have derived from a single archaeological occupation of the site.

Ceramics

Our excavations at the Overhead site produced a total sample of 256 potsherds (Table 1). All are tempered with crushed shell although many have had the shell leached out, what McKern (1945: 145) referred to as "cell tempering". Vessel exteriors were finished by smoothing, producing dull, non-lustrous surfaces. Polishing, painting, slipping, and cord or fabric impressions are completely lacking. Decoration was produced by trailed lines, finger impressions, or by impressions with an untoothed, cylindrical tool and was limited to one or more of the following areas: the inner edge of the upper rim just below the lip, to the lip surface, to the handles, or to the vessel exterior in the shoulder area and below.

TABLE 1

DISTRIBUTION OF CERAMICS BY SHERD AND BY VESSEL

(Decoration in this Table refers only to exterior surfaces; not recorded here are lip or internal rim decoration.)

	RIM		BODY		HANDLES		
	Dec.	Plain	Dec.	Plain	Dec.	Plain	Total
AREA 1							
Feature 2: Vessel D	-	2	2	6	-	-	10
Feature 2: various	-	-	1	25	-	1	27
Feature 4: Vessel A	-	4	55	88	-	-	147
Feature 4: various	-		5	5	-	-	10
AREA 2							
Surface	-	1	-	7	-	-	8
Feature 1: Vessel B	-	2	4	8	2	-	16
Feature 1: Vessel C	-	1	18	12	-	-	31
AREA 3							
Feature 3: various	-	-	2	3	-	-	5
UNKNOWN	-	1	-	1	-	-	2
	0	11	87	155	2	1	256

As can be seen from Table 1, 11 of the 256 sherds were classified as rims, which is here defined as that portion of a vessel between the point of maximum constriction (neck) and the vessel orifice (lip). As it turned out, none of these rimsherds was large enough to extend below the neck. All had the lip preserved.

Although all 11 rims lack decoration on their exterior surfaces, none is completely devoid of all decoration. Six of these sherds, those from Vessels A and D, had both plain exteriors and lips but had been decorated internally near the upper edge of the rim with oblique tool impressions. The other 5 rims have only decorated lip surfaces: the lips of the two Vessel B rims were decorated with oblique tool impressions while the remaining 3 rimsherds have lips decorated with vertical punctations, probably with a finger tip.

Again referring to Table 1, it can be seen that of the 242 body sherds (i.e. sherds from those portions of a vessel below the neck), 87 (36%) show evidence of decoration. This decoration consists entirely of trailed lines. The term trailed here conforms to the definitions of both Wedel (1959:88-89) and Gibbon (1970:96), the former considering a trailed line to be one produced by drawing an instrument across a clay surface so as to produce an impression that is wider than it is deep, while the latter defines a trailed line simply as one having been produced by trailing an instrument across a damp clay surface before the vessel was fired. In our sample the trailed lines vary in width from less than 1 mm. in the case of Vessel A (Fig. 8) to as high as 8 mm. Without exception, the decorative motif involves multiple parallel lines. In every case except three the trailed lines extend downward from just below the neck across the shoulder region roughly at right angles to the plane of the vessel orifice (Wedel 1959:Fig. 35, a and b;

Henning 1961:Fig. 2, k; Gibbon 1970:Fig. 1, 1). The three exceptions involve sherds with two sets of parallel trailed lines that intersect one another at an acute angle in two cases and at nearly a right angle in the third (Wedel 1959: Fig. 35, d). No punctations at all were observed in our sample.

The handles in our sample consist of three fragments from two vessels. One handle fragment from Feature 2 is undecorated (Fig. 10e). Two fragments from a single handle were recovered from Feature 1. This handle was decorated by apparently welding two parallel ridges of clay to the surface of the handle producing the effect of three longitudinal grooves (Fig. 9).

Our ceramic sample of 256 sherds originated from a minimum of 9 separate vessels, 2 each from Features 1, 2, 3, 4 and one from the surface of Area 2. Four of these vessels were easily identifiable either because of the size or the distinctiveness of the sherds that composed them. These four were given formal letter designations (Table 1). The remaining sherds, while definitely not assignable to Vessels A through D, could less certainly be assigned to specific vessels with positive, definable characteristics. These vessels were given no formal letter designations, and no attempt is made below to characterize them individually.

Ceramic Vessel A was recovered from near the base of Feature 4 where it had evidently been intentionally placed before the pit had been filled in (Fig. 6). A total of 147 individual sherds can be assigned to this vessel with confidence although many can no longer be restored to the reconstructed portions of the vessel. Enough of this vessel was reconstructed to indicate that well over half of the vessel is now represented in our sample. As indicated above, the interior of the rim near the lip had been decorated with oblique tool impressions.

FIGURE 8
Vessel A Partially Reconstructed. This Vessel is Shown *in situ* in Feature 4 in Fig. 6.

FIGURE 9
Vessel B

Beginning 20 to 30 mm. below the neck constriction, the exterior of the vessel had been decorated with fine trailed lines less than 1 mm. in width that run vertically down across the shoulder an undetermined distance onto the body (Fig. 8). The trailed lines generally parallel one another at distances of 17 to 38 mm. apart. There is no evidence of handles on this vessel. The following are the estimated dimensions of Vessel A:

Height	over 200 mm.
Rim height (neck to lip)	18 mm.
Orifice diameter	ca. 195 mm.
Neck diameter	ca. 185 mm.
Shoulder diameter	ca. 205 mm.

Vessel A can be assigned to the formal type Allamakee Trailed as defined by Wedel (1959:91-92) and Henning (1961:28-29).

Vessel B is composed of 16 sherds, primarily a handle and adjacent sherds, found in Feature 1 (Fig. 9). As noted earlier, the lip was decorated with oblique tool impressions and the handle with two parallel ridges of clay that had apparently been added to the surface. Beginning at the base of the handle or just below the neck are a series of trailed lines up to 5 mm. wide. These tend to be spaced at distances of about 10 mm. and apparently extend more or less vertically downward over the shoulder of the vessel. Because of the fragmentary nature of this vessel, none of its dimensions can be estimated. Like Vessel A, this vessel can also be classed as Allamakee Trailed as defined by Wedel (1959:91-92) and Henning (1961:28-29).

Vessel C consists of 31 sherds also from Feature 1. These sherds were readily identifiable and assigned to this vessel on the basis of their distinctive reddish paste and abundant, fine shell temper. Only five of these sherds could be glued together, but these are enough to indicate that the decorative motif involved sets of four or more parallel trailed lines that intersect

other sets of similar lines at oblique angles (Fig. 10f). The orientation of these trailed lines relative to the lip cannot be ascertained since the sole rimsherd from this vessel is a tiny crumb that cannot be articulated with any of the decorated body sherds. Though fragmentary, Vessel C, too, would seem to conform to the type definition of Allamakee Trailed.

Vessel D is defined around 2 rimsherds and 8 body sherds of obviously similar paste recovered from Feature 2. The rims were decorated only on the interior surface near the lip where they had been impressed with a cylindrical tool, perhaps a finger (Fig. 10a-b). The 2 decorated body sherds are small, both showing short segments of two parallel trailed lines. None of the sherds from Vessel D could be glued together, so nothing can be said about decorative motif nor about vessel size or form. Vessel D is too fragmentary to be assigned to a formal ceramic type.

The aggregate of features that characterized our Overhead ceramic sample permits us readily to assign it to the Oneota tradition. Shell tempering; smooth surfaces; decoration by trailed lines in rectilinear motifs principally in the shoulder area; and globular vessel forms with rounded shoulders and bases, a constricted neck, and strap handles are among these more distinctive Oneota features.

Within the state of Wisconsin, considerable variability within the Oneota tradition is recognized and is normally given formal, taxonomic recognition in terms of four regional "phases" (substituting the now more widely accepted Willey and Phillips term—1958:22—for the older concept of "focus" from the McKern system). These four Wisconsin Oneota phases are (Hall 1962:100): Lake Koskonong, Grand River, Lake Winnebago, and Orr, which is also found in northeastern Iowa. Based upon ceramic typology, as well upon geographic location, the Overhead site is assignable to the Orr phase as that phase is currently

conceived.

The definition of the Orr phase within the Oneota tradition is based heavily upon ceramics. The best known, excavated Orr sites are located in the Upper Iowa river valley in northeastern Iowa (Wedel 1959) and in the Mississippi alluvial valley in Trempealeau, LaCrosse, and Vernon counties of western Wisconsin (McKern 1945; Gibbon 1970). The ceramics from these sites are well described in the references cited immediately above as well as in two other relevant works (Griffin 1943:287-93 and Henning 1961). Based upon these reports, we may summarize the distinguishing characteristics of Orr phase ceramics within the Oneota tradition as follows:

1. high incidence of lip and/or internal rim decoration (normally over 50% of the vessels)
2. high incidence (i.e. well over 50% of the vessels) of exterior shoulder and body decoration
3. exterior decorations consisting of trailed lines, sometimes combined with punctations, in rectilinear motifs, the most common of which are parallel lines extending from the neck region downward across the shoulder; Allamakee Trailed is the formal type to which most of these sherds are assigned (Wedel 1959:91-92; Henning 1961:28-29)
4. high frequency of strap handles, normally present on from 1/3 to 1/2 of the vessels; especially distinctive are handles decorated with longitudinal grooves or channels.

Since each of these characteristics applies well to the Overhead ceramic industry, the assignment of this site to the Orr phase seems warranted.

FIGURE 10
Miscellaneous Sherds: a-b, Vessel D Rimsherds; c-d, Decorated Body Sherds from F. 3 area; f, Vessel C Body Sherds

FIGURE 11
Selected Stone Artifacts: a, Endscraper; b, Graver; c, Triangular Projectile Point; d, Flake (drill?) with Bifacial Retouch; e, Flake with Almost Complete Marginal Retouch

It should be emphasized, however, that among the various sites of western Wisconsin and eastern Iowa that have been classified in the Orr phase, the closest affinities of the Overhead site are clearly with the nearby Midway village (McKern 1945; Gibbon 1970).

Lithics

A total of 120 stone artifacts or artifact fragments was recovered during our excavations of the Overhead site (Table 2). The vast majority of these, 86 (72%), are fragments of unworked and unutilized debitage. This debitage was classified into two categories: (1) flat flakes, thin flakes with obvious dorsal and ventral faces, a striking platform (if unbroken) and a positive bulb of percussion suggesting that they had been intentionally detached from the parent material by either pressure or percussion and (2) block flakes, multi-faceted blocks lacking striking platforms, bulbs of percussion, and opposing dorsal and ventral faces; sometimes referred to as shatter, block flakes are presumably the inadvertent by-products of the flaking process although some may have been naturally rather than humanly produced. This unutilized debitage is considered artifactual because most if not all of it was humanly created during the manufacturing stages of flaked stone tool production. Except for one quarzite flat flake from the surface of Area 2 all the debitage is of chert.

Taking note of the distribution of debitage within a site can provide useful information, for high concentrations reflect areas of flint knapping activity, presumably a male activity. At the Overhead site, the debitage was not randomly distributed, but shows two clear concentrations within the limited areas that we excavated: in Feature 2 and, especially, in and around Feature 3 (Table 2). The high frequency of unused debitage in the Feature 3 vicinity coupled with the paucity of utilized and retouched artifacts and

TABLE 2

DISTRIBUTION OF STONE ARTIFACTS

	Flat Flakes Retouch	Utilized	Unutilized	Block Flakes Unutilized	Bifaces	Cores	Miscel.	Totals
AREA 1								
Surface				1		1		2
Feature 2	5	3	18	5	4	2	1	38
Feature 4	2	2	8	1			1	14
AREA 2								
Surface	2		3			1		6
Feature 1								0
AREA 3								
Surface		4	42					46
Feature 3		4	7	1	1		1	14
Totals	9	13	78	8	5	4	3	120

the absence of cores suggests that the retouching or resharpening of completed or nearly completed artifacts rather than their original production had been carried out here. By contrast, Feature 2 contained a broader range of stone artifact types including 2 cores (plus a third from the surface nearby), 6 of the site's 7 bifaces or biface fragments, and the sole fragment of a sandstone abrader found by us (Table 2). These data suggest that the hearth area of the Area 1 house was the focus of a wide range of flint knapping activity from the original production to the final shaping of stone and possibly even bone tools.

Besides the unutilized debitage, our lithic sample contains 13 utilized and 9 retouched flat flakes, all of chert (Table 2). The utilized flakes were distinguished on the basis of edge nibbling, i.e. regular, small removals extending no more than 1 mm. onto a flake face that were presumably the inadvertent byproduct of human utilization of the flake as a cutting or scraping tool. As can be seen from Table 2, eight of these utilized flakes were recovered in or around Feature 3 while the remaining five were found within the fill of the two pits in the Area 1 house. Retouched flakes, on the other hand, have had their margins intentionally modified by either pressure or percussion flaking as evidenced by long (extending more than 1 mm. from an edge as a rule of thumb) and regular flake scars directed onto at least one edge. Of the 9 retouched flakes, 5 are incomplete edge fragments. The 4 more or less complete retouched flakes are pictured in Figure 11. One is a carefully made graver on a small flake fragment (Fig. 11b), one is an endscraper (Fig. 11a), another is an enigmatic flake with nearly complete marginal steep retouch (Fig. 11e) while the fourth is a flake with bifacial edge retouch designed apparently to have created a drill (Fig. 11d).

Endscrapers are a characteristic feature of the Oneota tradition generally and, of course, of the Orr phase (e.g. McKern 1945:132). Gravers have been reported from Orr phase sites in Iowa (Wedel 1959:51) though not previously in Wisconsin (McKern 1945; Gibbon 1970) while drills are reported from Orr sites in both states. As indicated in Table 2, 7 of the 9 retouched flakes were recovered from the two pits in the Area 1 house, including all those pictured in Fig. 11, except 11e.

Only 5 among the 120 stone artifacts were classed as bifaces. Unlike the 2 flat flakes with bifacial edge retouch (e.g. Fig. 11d), these artifacts have flake scars that cover well over half the area of both faces. Four of the 5 are edge fragments of larger chert artifacts, but are too small to permit further identification. The sole identifiable biface is a tipless, triangular projectile point of quartzite that was recovered from Feature 2 (Fig. 11c). Its dimensions are: length = 22.2 mm. (estimated unbroken length = 24 mm.); basal width = 16 mm.; and thickness = 4.5 mm. Small triangular projectile points are especially characteristic of the Oneota tradition as a whole, though, of course, are not unique to it (McKern 1945:132). As can be seen from Table 2, all of the bifaces except one, an edge fragment from Feature 3, were recovered from Feature 2.

The remaining stone artifacts yet to be discussed include 4 chert cores, 2 cobble hammerstones, and an abrader fragment of coarse, brown sandstone. Two of the cores are actually core fragments and cannot be described further, but two are unbroken. One of these, from the surface of Area 2, is disc-shaped with a diameter that ranges from 60-90 mm. It has a more or less continuous edge onto which blows had been struck in alternating directions so as to detach flakes from both faces. By contrast, the other complete core (from Feature 2)

may be described as pyramidal with a height of 41 mm. and an irregular basal plane whose dimensions range from 50-80 mm. The base of this pyramidal core served as the striking platform onto which all blows were struck in a single direction, which was toward the apex. The hammerstones, both cobbles of igneous rock with evidence of battering, were found in the two storage or refuse pits, Features 3 and 4. The sandstone abrader fragment, as noted earlier, was recovered from Feature 1, the hearth inside the Area 1 house. Abraders are a normal occurrence at sites of the Oneota tradition (McKern 1945:130).

Bone Artifacts

The sole artifact of bone recovered in our excavations was the bison scapula hoe found in Feature 4 within the Area 1 house (Fig. 6). Upon discovery, the scapula was nearly intact although it was criss-crossed with cracks and in a poor state of preservation. It had apparently been laid carefully in the pit with its ventral surface up. Identification as a hoe is based upon the observed deep concavity, presumably the result of wear, that is readily visible in the vertebral margin opposite the glenoid fossa of the scapula (Fig. 6). A bison scapula from an Orr phase site in Iowa showing an identical concavity is illustrated in Wedel (1959: 160). Also, part of the spine had been broken away, although whether intentionally or not could not be ascertained because of the pitted and eroded character of the bone surfaces. The eroded character of the surfaces also prevented us from positively determining whether or not polish, striations, or other signs of wear besides the concavity itself were present anywhere on the scapula.

During the drive back to Madison, despite the fact that the scapula had been left encased in its original matrix, many of the cracks in

the bone opened and became the source of a certain amount of internal erosion. As a result we have been unable to completely restore the bone. Thus the only complete picture we shall ever have of this tool are those that we took in the field (e.g. Fig. 6). Enough of the scapula did remain intact, however, to permit us to determine positively that it was bison.

SUMMARY AND CONCLUSIONS

Despite extensive disturbance by bulldozers that has resulted in the complete destruction of its upper levels, the Overhead site has provided useful and even unique information bout a chapter in the book of Wisconsin's prehistoric past. Needless to say, we would have preferred to have excavated the site prior to the onset of construction work, but given no alternative, there is consolation in the fact that careful archaeological excavations can still be rewarding even in badly distrubed sites.

Based upon the combined evidence of features and artifacts, there can be no doubt about assigning the Overhead site to the Oneota tradition. Among the more characteristic Oneota features and artifacts found at the Overhead site were: storage and/or refuse pits; shell-tempered, smooth surfaced, trailed line decorated, globular ceramic jars with constricted necks and handles; small triangular projectile points; endscrapers; sandstone abraders; and bison scapula hoes. Based upon ethnographic analogy (Skinner 1926:277) and archaeological evidence from Carcajou Point (Hall 1962:17) and Walker-Hooper (Gibbon 1969:51-53), wigwam-like structures (perhaps occupied only seasonally) can also probably be considered as characteristic of the Oneota tradition in Wisconsin.

Within the Oneota tradition, the Overhead site most closely resembles the Midway site,

which is traditionally classified in the Orr phase (McKern 1945:163; Gibbon 1970). Most characteristic of the Orr phase are its ceramics, especially the type Allamakee Trailed, which was originally defined on the basis of collections from northeastern Iowa (Wedel 1959:91-2). The decorated ceramics from the Midway site have been generally considered within or at least near the range of variation of Allamakee Trailed although recent investigators have generally expressed some trepidation at including the Midway ceramics in this type (Wedel 1959: 121; Henning 1961:35-6; Hall 1962:132). There are a number of significant differences between the trailed decorated ceramics of the Midway site and other Wisconsin Orr phase sites as contrasted with the "classic" Allamakee Trailed type as known from northeastern Iowa, particularly from the Lane Enclosure. In particular the Wisconsin Orr phase ceramics differ from those of northeastern Iowa in their lesser frequency of lip decoration, especially notching (cf. Henning 1961:20 and Gibbon 1970:89); in their apparent tendency toward broader trailed lines (cf. Gibbon 1970:96-7 and Wedel 1959:92); in the lesser occurrence of punctate-filled triangular areas, which are so characteristic of the Lane Enclosure in particular (cf. Wedel 1959:164 and Gibbon 1970:102); and in the preponderance of circular instead of elongate "dash" punctations (cf. Gibbon 1970:98 and Wedel 1959:100-1). That these differences may be significant enough to merit classification of the Wisconsin sites into a different phase or subphase from the traditional Orr sites of northeastern Iowa is given added support by the occurrence of historic trade goods in the Iowa but never the Wisconsin sites (Wedel 1959: 63-77). That the Wisconsin sites are prehistoric is, of course, also fully confirmed by the available radiocarbon dates (Gibbon 1970:83

and above). Whatever taxonomic nomenclature or categories one chooses to utilize, however, it seems clear that archaeological sites of northeastern Iowa and western Wisconsin that have been traditionally assigned to the Orr phase do have much in common and should be regarded as part of the same cultural continuum, the former being the younger and the latter the older.

Within the Orr phase (using this concept in its broadest sense to include both northeastern Iowa and southwestern Wisconsin), the Overhead site is currently unique in affording evidence of a dwelling structure. The post hole alignment that we exposed here apparently was produced by a wigwam-like structure that, judging from its size, would have served admirably as a single nuclear family dwelling. In the floor of this house were two features and a probable third, a hearth, an apparent storage pit, and a cluster of post holes along the northwest side of the house that might reasonably be interpreted as a bench or platform. The hearth area showed a relatively high concentration of chert debitage and most of the bifaces and cores recovered by us at the site suggests that this feature was a focus of flint knapping activities. The storage pit produced a bison scapula hoe, one of the few so far reported from a prehistoric Wisconsin site, a nearly complete ceramic vessel, a hammerstone, and enough charcoal for radiocarbon dating: A.D. 1510 ± 65 years (WIS-573). Despite the fact that 57 liters of soil from this feature were water screened, no evidence of corn was found. There were some faunal elements recovered from the pit, including fish and turtle as well as mammal, but no seasonally sensitive species were included. Thus we were unable to determine whether or not the house was occupied during particular seasons of the year.

Since the Iowaу occupied northeastern Iowa in early historic times, and since historic

trade goods have been found in Orr phase sites in this area (Wedel 1959:63-77), it has been generally accepted that the Orr phase represents the archaeological remains of this Siouan speaking people. According to Skinner (1926:277) the Ioway constructed oval bark and mat houses that usually ranged in size from 14 to 20 feet long by 10 feet wide. Inside these houses were normally found a central hearth and benches along the side. The Overhead structure is entirely consistent with the ethnographic data, and in this sense is further supportive of the generally accepted association of the historic Ioway with the Orr phase.

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ANIMAL RESOURCE UTILIZATION AT THE COOPER'S SHORE SITE (47R02) ROCK COUNTY, WISCONSIN

Lois K. Lippold
San Diego State University

ABSTRACT

This paper reports the results of an analysis of the faunal remains recovered from the Cooper's Shore site, a late Middle Woodland site in Rock county, Wisconsin, and compares these results with the two other Middle Woodland sites in Wisconsin for which comparable data are available. The analysis indicates that the site was occupied during at least the spring, summer and fall and most likely during the winter. In this respect it resembles the Millville site, but is unlike the more narrowly seasonal Mero site Faunal inventories at Middle Woodland sites with more protracted occupation, like Cooper's Shore and Millville, are characterized by a greater diversity of animal species than more seasonally occupied sites like Mero.

The Cooper's Shore Site, a late Middle Woodland manifestation in southern Wisconsin, affords one of the largest faunal inventories from the state. This significant body of data was analyzed to reveal facets of the prehistoric economy. Specific objectives of the research were: to determine which species were utilized by the inhabitants of the site so that these could be compared to sites already

analyzed, to attempt to determine whether the site occupation was seasonal or year round, and to observe cultural patterns involved in butchering techniques. The analysis of the Cooper's Shore site and its subsequent comparison to other Middle Woodland sites provides a clear picture of animal resource utilization during this period.

Cooper's Shore (47R02) is situated along the Rock River at the outlet of Lake Koshkonong in Rock County, Wisconsin. The site borders the northern shore of the Rock, extending approximately 3,000 feet along the river and between 1,000 and 2,000 feet back. Cooper's Shore is bounded on the west by a marsh lowland that extends north toward a small pond 1,500 feet from the river. The northern limits of the site are formed by an irregular ridge, the eastern limits by the junction of this ridge and the river bank.

The original land survey reveals that the Cooper's Shore midden was once part of an oak savanna, and the nature of the soils comprising the site attest to this (Jaehnig et al, 1968:9). Now, however, the presence of the river adjacent to the site has introduced elements of a lowland floodplain vegetation and black willow, cottonwood, river birch, swamp white oak and basswood are some of the trees represented.

The data on which this paper is based were gathered by Wayne Wiersum during the course of his test excavations at the site in 1964 and again in 1967. A report of these excavations and of the artifacts recovered was submitted as a Masters thesis to the Department of Anthropology at the UW-Madison (Wiersum

(1968), but is not yet published.

Temporal placement of Cooper's Shore was based upon the recovery of ceramics which show typical middle to late Middle Woodland characteristics. Steuben Punctated and Havana Plain comprise the common Havana-like, Middle Woodland wares while Baehr Brushed and Baehr Rim represented the Hopewell ware group suggesting an occupation late in the Middle Woodland period. Sherds of Weaver Plain and Weave Cordmarked representative of the late Middle Woodland accounted for 51% of the total ceramic inventory. Based upon ceramic typology, an age estimate of 250 to 350 A.D. has been made for the site by Wiersum (1968:134).

FAUNAL REMAINS

The faunal assemblage from Cooper's Shore was large, coming from features anc midden materials. Forty-five species of vertebrates were identified (Lippold 1971 Mammals were by far the most important group; they comprised over 96% of the estimated meat poundage. Of these, deer accounted not only for the largest percentage of elements present but also the largest minimum number of individuals anc estimated pounds of meat (Table 1).

In the ensuing discussion severa species which appear to have either cultu or ecological implications are discussed Two dogs were identified; their remains, represented by four elements, were concer trated in a single square. At first this concentration was suggestive of a burial but closer examination revealed a mixture of immature and mature elements of a random nature. Because some of these eleme

were identical (e.g. right ulnae) but of different ages, it was clear that at least two individuals were represented.

The Franklin ground squirrel, represented by two elements, presently occupies a habitat restricted to the southern and western one-half of the state according to Jackson (1961:140). Hall and Kelson (1959: 351) restrict its distribution even further and confine it to the southwestern one-third of the state outside the site location altogether.

Wisconsin puma, largest of the state's cats, was identified from two elements. While there is a possibility that the canine and terminal phalanx identified may have been obtained in trade, no evidence could be found to support or to deny this. Under microscopic examination, both elements failed to show signs of intentional alteration.

Jackrabbit, represented by one right maxilla, is a species that is presently widespread except in the extreme northern counties of the state. The species does not appear indigenous to the state for Leopold (1947:13) says that: ". . . the present jackrabbit populations originated in part from plantings, but the bulk of it probably represents the natural spread from the West". Jackson (1961:106) also does not feel that thisspecies is indigenous to Wisconsin, and Hall and Kelson (1959:291) delimit the species range as just barely into the southwestern and central western counties of the state. In other words, none of the investigators feels that the jackrabbit (*Lepus townsendii)* is found east of the 89th parallel, an area which entirely excludes eastern Wisconsin and the site area.

TABLE 1

VERTEBRATES AND MOLLUSCA IDENTIFIED FROM THE COOPER'S SHORE SITE

Species	Elements	%	Minimum No. of Individuals	%	Est. Lbs. of Meat	%
Mammals	631	38.42	42	34.71	3438.22	99.35
Lepus townsendii Jackrabbit	1	.06	1	.82	3.0	.08
Marmota monax Woodchuck	5	.30	1	.82	5.6	.15
Citellus tridecem-lineatus 13-lined Ground Squirrel	2	.12	1	.82	.40	.01
Citellus franklinii Franklin Ground Squirrel	2	.12	1	.82	1.0	.02
Tamias striatus Chipmunk	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Castor canadensis						
Beaver	5	.30	2	1.65	77.0	2.15
Microtus pennsylvanicus						
Meadow Vole	2	.12	1	.82	—	—
Ondatra zibethicus						
Muskrat	29	1.76	4	3.30	8.0	.22
Erethizon dorsatum						
Porcupine	2	.12	1	.82	10.0	.28
Canis familiaris						
Dog	9	.54	2	1.65	17.2	.48
Canis lupus						
Gray Wolf	1	.06	1	.82	30.0	.84
Ursus americanus						
Black Bear	2	.12	1	.82	210.0	5.88
Procyon lotor						
Raccoon	20	1.21	3	2.47	52.5	1.47
Lutra canadensis						
River Otter	2	.12	1	.82	12.5	.35
Felis concolor						
Puma	2	.12	1	.82	60.0	1.68

TABLE 1 (cont.)

Species	Elements	%	Minimum No. of Individuals	%	Est. Lbs. of Meat	%
Cervus canadensis Elk	15	.91	2	1.65	700.0	19.61
Odocoileus virginianus White-Tailed Deer	523	31.85	16	13.22	1600.0	44.84
Bison bison Bison	2	.12	1	.82	650.0	18.21
Fragments	5517	—	—	—	—	—
Birds	57	3.47	22	18.18	56.1	1.57
Gavia immer Common loon	2	.12	1	.82	3.0	.09
Podilymbus Podiceps Pied-Billed Grebe	4	.24	1	.82	.9	.02
Phalacrocorax						

Ardea herodias						
Great Blue Heron	1	.06	1	.82	10.0	.29
Olor columbianus						
Swan	1	.06	1	.82	10.0	.29
Anas platyrhynchos						
Mallard	1	.06	1	.82	2.0	.05
Anas carolinensis						
Green-Winged Teal	4	.24	1	.82	.9	.02
Anas discors						
Blue-Winged Teal	4	.24	1	.82	1.0	.02
Spatula clypeata						
Shoveller	2	.12	2	1.65	4.0	.12
Aix sponsa						
Wood Duck	2	.12	2	1.65	2.0	.05
Aythya americana						
Redhead	4	.24	1	.82	2.0	.05
Aythya collaris						
Ring-Necked Duck	8	.42	3	3.19	4.5	.12
Aythya affinis						
Lesser Scaup	4	.24	1	.82	1.5	.04

TABLE 1 (cont.)

Species	Elements	%	Minimum No. of Individuals	%	Est. Lbs. of Meat	%
Bucephala clangula Common Goldeneye	1	.06	1	.82	.9	.02
Erismatura jamaicensis Ruddy Duck	1	.06	1	.82	.9	.02
Meleagris gallopavo Turkey	2	.12	1	.82	8.5	.24
Fulica americana American Coot	11	.66	2	1.65	2.0	.05
Fragments	113	—	—	—	—	—
Reptiles	82	4.99	14	11.57	18.0	.50
Chelydra serpentina Snapping Turtle	11	.66	1	.82	5.0	.15
Sternothaerus odoratus Musk Turtle	12	.66	2	1.65	2.0	.05

Terrapene sp.						
Box Turtle	1	.06	1	.82	1.0	.02
Graptemys geographica						
Map Turtle	5	.30	4	3.30	4.0	.11
Chrysemys picta						
Painted Turtle	39	2.37	4	3.30	4.0	.12
Emys blandingii						
Blandings Turtle	16	.97	2	1.65	2.0	.05
Fragments	209	—	—	—	—	—
Fishes	102	6.21	16	13.22	56.50	1.62
Lepisosteus sp.						
Gar	2	.12	1	.82	1.5	.05
Ictalurus sp.						
Catfish	27	1.64	7	7.44	28.0	.79
Ictalurus sp.						
Bullhead	3	.18	2	1.65	3.0	.09
Aplodinotus grunniens						
Drum	70	4.26	6		24.0	.69
Fragments	1169	—	—	—	—	—

TABLE 1 (cont.)

Species	Elements	%	Minimum No. of Individuals	%	Est. Lbs. of Meat	%
Pelecypods	370	22.53	27	22.31	.27	.007
Fusconaia ebenus						
Niggerhead	3	.18	1	.82	.01	@
Fusconaia flava						
Wabash Pig-Toe	2	.12	1	.82	.01	@
Amblema rariplicata						
Blue Point	4	.24	1	.82	.01	@
Amblema peruviana						
Blue Point	5	.30	3	2.49	.03	@
Amblema costata						
Three-Ridged	82	4.99	1	.82	.01	@
Quadrula pustulosa						
Pimple-Back	1	.06	1	.82	.01	@
Elliptio dilatatus						
Spike	15	.91	1	.82	.01	@
Lasmigona complanata						
White Heel-Splitter	11	.67	2	1.65	.02	@
Lasmigona costata						
Fluted Shell	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Actinonaias carinata						
Mucket	41	2.50	2	1.65	.02	@
Proptera sp.						
Pink Heel-Splitter	2	.12	1	.82	.01	@
Ligumia recta						
Black Sand Shell	25	1.52	1	.82	.01	@
Lampsilis siliquoidea						
Fat Mucket	115	7.00	10	8.29	.10	@
Lampsilis ventricosa						
Pocketbook	61	3.71	1	.82	.01	@
Fragments	1560	—	—	—	—	
Gastropods:						
Terrestrial	250	15.23	—	—	—	
Anguispira alternata						
Say	81	4.93				
Hawaiia minuscula						
Binney	63	3.83				
Helicodiscus parallelus						
Say	53	3.22				
Stenotrema fraternum						
Say	17	1.03				

TABLE 1 (cont.)

Species	Elements	%	Minimum No. of Individuals	%	Est. Lbs. of Meat	%
Vallonia parvula Sterki	8	.48				
Gastrocopta armifera Say	7	.42				
Zonitoides arboreus Say	6	.36				
Retinella indentata Say	4	.24				
Discus cronkhitei Newcomb	3	.18				
Gastrocopta contracta Say	3	.18				
Carychium exiguum Say	1	.06				
Gastrocopta holzingeri Sterki	1	.06				
Pupoides albilabris C.B. Adams	1	.06				

Tridopsis multilineata Say	1	.06
Fragments	72	—
Gastropods: Aquatic	150	9.13
Stagnicola palustris elodes Say	76	4.62
Pleurocera acuta tracta Anthony	43	2.61
Lioplax subcarinata wisconensis Baker	8	.48
Campeloma decisum Say	7	.42
Helisoma trivolvis Say	4	.24
Helisoma antrosa Say	3	.18
Amnicola walkeri Pilsbry	2	.12
Helisoma campanulata Say	2	.12

TABLE 1 (cont.)

Species	Elements	%	Minimum No. of Individuals	%	Est. Lbs. of Meat	%
Physella sayii Tappan	2	.12				
Pomatiopsis lapidaria Say	1	.06				
Valvata tricarinata Say	1	.06				
Totals	1642	99.98	121*	99.99*	3569.09*	100.00*

@ Less than 0.01%

* Do not include snails

Seventeen species of birds were identified with all but one of these belonging to the water bird group. Many of the species recovered breed in the area, and there are reports (Bent 1932) of several of the species breeding at Lake Koshkonong (ring necked duck, green winged teal, redhead, and the lesser scaup). It is significant that birds that presumably bred near the site area were taken in a ratio of 9 to 1 over those that did not.

Six species of turtles provided less than a pound of meat to the diet. However, they probably reflect a particular aspect of the economy, the efforts of females, children and the aged since these food resources can be found close to the site and are, therefore, readily accessible to this segment of the population.

Turtle remains were instructive concerning the environment of the site area. Of the six turtles, the Musk is sharply confined to southern Wisconsin while Map, Blandings and Snapper are restricted primarily to southern Wisconsin. The distribution of the Painted turtle includes the southern part of the state, but it is more often found in southeastern Wisconsin. A habitat suitable for the Box turtle is not found in the state except in isolated instances in southern Wisconsin.

Peleycpods constituted a supplementary source of food in much the same fashion as birds, reptiles and fish. While they contributed less than one-half pound of meat, they were useful in both the reconstruction of river water conditions and in reconstruction of river bottom conditions. Table 2 groups the pelecypods according to size of water body and nature of the bottom, and demonstrates that 139 pelecypods came from mud habitats as

TABLE 2

FREQUENCIES OF PELECYPODS BY HABITAT*
FROM THE COOPER'S SHORE SITE

Species	Large Rivers		Small Rivers		Widely Dist.	
	Mud	Sand	Mud	Sand	Mud	Sand
Actinonaias carinata	41					
Elliptio dilatatus	15					
Lampsilis ventricosa	61					
Ligumia recta	25					
Amblema peruviana		5				
Amblema rariplicata		4				
Fusconaia ebenus		3				
Amblema costata			82			
Fusconaia flava			2			
Quadrula pustulosa				1		
Lasmigonia costata					3	
Lampsilis siliquoidea						115
Lasmigona complanata						11

* from Baker: 1928

compared to 142 from a sand or gravel habitat (Baker 1928).

Large numbers of gastropods identified by Dr. D. A. Baerreis of the University of Wisconsin-Madison, Department of Anthropology revealed additional information pertaining to the environmental conditions in the immediate area of the site. While many of these gastropods (both aquatic and terrestrial) were not collected by man, they occurred in the site area because it afforded a suitable habitat. In fact, the majority of the species do not reflect man's overt influence since they were not collected as food items. They reflect instead his indirect influence, since man's occupation of an area disturbed it and most certainly changed it. That is to say, directly changing the environment through occupation resulted in an indirect influence upon the species of terrestrial gastropods that occurred.

Eighty-one of the aquatic gastropods are found in quiet waters, fifty in swift current with sand or gravel bottoms, eight in mud, four in gravel and sand, two in lakes and one in shallow water (Table 3). The majority of these gastropods probably were deposited on the site area during spring flooding, it being difficult to account for them in the site matrix in any other way. A temporary flooding of part of the site during the spring would result in an interruption in occupation, at least in the area immediately adjacent to the water.

Table 4 demonstrates the habitat preferences of the terrestrial gastropods. Seven species, totaling 205 gastropods, are found primarily in wooded upland habitats while the remaining seven species can be found in a variety of habitats (Pilsbry 1939-48).

It is quite possible that some of the terrestrial gastropods such as *Anguispira alternata* may have been collected and utilized as food items since they are relatively large

TABLE 3

FREQUENCIES OF AQUATIC GASTROPODS BY HABITAT* FROM THE COOPER'S SHORE SITE

Species	Quiet Water	Swift Water G/S**	Mud	G/S**	Lakes	Shallow Water
Stagnicola palustris elodes	76					
Helisoma trivolvis	4					
Helisoma antrosa	3					
Pomatiopsis lapidaria	1					
Pleurocera acuta tracta		43				
Campeloma decisum		7				
Lioplax subcarinata wisconensis			8			
Amnicola walkeri				2		
Physella sayii				2		
Helisoma campanulata					2	
Valvata tricarinata						1

*from Pilsbry 1939-48

**Gravel-Sand

TABLE 4

FREQUENCIES OF TERRESTRIAL GASTROPODS BY HABITAT FROM THE COOPER'S SHORE SITE

Species	Wooded Floodplains	Wooded Uplands	Varied
Anguispira alternata	81		
Hawaiia minuscula	63		
Helicodiscus parallelus	53		
Discus cronkhitei	3		
Gastrocopta contracta	3		
Carychium exiguum	1		
Tridopsis multilineata	1		
Stenotrema fraternum		17	
Vallonia parvula			8
Gastrocopta armifera			7
Zonitoides arboreus			6
Retinella indentata			4
Gastrocopta holzingeri			1
Pupoides albilabris			1
Succinea avara			1

and plentiful in favorable habitats. It must be noted that if this species was collected the number occurring in the site would not necessarily be a reflection of the site environment. A possible misinterpretation of this species was avoided by excluding this species and inspecting the remaining gastropod species and their habitat preferences. From this inspection it appears certain that most of the remaining gastropods were not intentionally collected since they are minute in size. These species, from which a truer picture of the site conditions could be obtained, illustrated that the overwhelming majority of terrestrial gastropods were from a wooded floodplain habitat.

ANALYSIS OF BUTCHERING PATTERNS

Evidence derived from the analysis of deer elements returned to the site revealed an interesting though not unique butchering pattern. Many mandibular and maxillary teeth were returned but actual numbers of intact mandibles were low with only one right and two left complete mandibles recovered. It would appear that these mandibles had not been used as tools since they showed no signs of polish, wear, or alteration.

Ribs and vertebrae were almost nonexistent there being only two cervical, one lumbar, and five caudal vertebrae identified out of a total of 523 deer bones. The apparent butchering practice was to leave the ribs and vertebrae at the kill site rather than return these relatively unproductive elements to the site.

Large numbers of identified deer bones belonging to the fore and hind limb suggested that these portions of the carcass, along with the scapulae and innominates, were returned to the site in their entirety. Also, three pieces of deer antler from various levels appeared to be worked into points, but they were

broken immediately behind the point making it impossible to determine the function or type of tools represented. One right deer metacarpal spatulate tool was recovered as well as several other mammal shaft fragments that were obviously altered; however, their fragmentary nature made their function difficult to ascertain.

The paucity of elements of animals other than deer made it difficult to discern whether butchering patterns for these animals existed. Many of the smaller animals such as muskrat apparently were returned to the site in their entirety since most of the bones of the skeleton were recovered. This, however, did not appear to be the case for raccoon. By far the largest number of elements from this animal came from the skull and mandible. Three complete left mandibles were identified as were two right ones. One of the right mandibles had been perforated through the ramus so that a cord could be passed through evidently as a means by which it could be worn. It appeared that the hole had been cut rather than drilled since there were a number of irregular cut marks surrounding the perforation.

EVIDENCE OF SEASONALITY

The presence at the site of extremely young animals suggests the site was occupied at least in spring and summer. Various ducks found in the site could have been taken in either summer or fall since most are migratory. Two water-oriented species (e.g., Coot and Goldeneye) are resident in the area and can be found in areas where there is open water in the winter. Other species identified are available throughout the year except for pelecypods and gastropods which because of their burrowing nature are relatively inaccessible during the winter months.

COMPARISONS AND CONCLUSIONS

Two other Wisconsin Middle Woodland sites have been analyzed, Millville (Pillaert 1969) and Mero (Cleland 1966) and will be compared with Cooper's Shore. Many features can be cite as being shared by these Middle Woodland sites. In all, mammalian remains supplied over 75% of the meat resources. Deer was the most importan food animal when expressed in terms of percentage of meat available (Lippold 1971:140).

Butchering practices at various sites were remarkably similar during this period as well. A characteristic pattern for deer could be ascertained from both Cooper's Shore and Millvill (Pillaert 1969). Elements which usually appear were those which constituted the fore and hind limb, pieces of the cranium, teeth, and antler. Commonly, metatarsals, metacarpals and long bones were broken and often only their proximal and distal ends remained intact. Apparently these elements were broken in the preparation of bone grease or in the preparation of tools. What appeared to be deer bone tools were not uncommon at these sites.

Deer elements most often missing or represented in small numbers at all sites were ribs and vertebrae. From this notable absence it would seem that the deer was butchered where it was killed and the axial skeleton, except for the head, left.

Further indications of animal resource utilization at Middle Woodland sites were observed. While it is true that the highest percentage of meat is derived from mammalian resources in all sites, features such as numbe of species per site, number of species per cla and season of site occupation differed.

Cooper's Shore and Millville (Pillaert 1969) demonstrated a high species number when compared to Mero (Cleland 1966). And, while

TABLE 5

MIDDLE WOODLAND RESOURCE UTILIZATION

Site	Number of Species		Number of Species per Class					
			M	B	R	A	F	P
Cooper's Shore	59		18	17	6	0	4	14
		%	(31)	(29)	(10)	(0)	(7)	(14)
Millville	49		15	8	5	0	6	15
		%	(31)	(16)	(10)	(0)	(12)	(31)
Mero	8		2	0	0	0	6	0
		%	(25)	(0)	(0)	(0)	(75)	(0)

Site	Biomass per Class						Three Highest Species in Est. Lbs. of Meat	
	M	B	R	A	F	P		
Cooper's Shore	3438.22	56.10	18.0	0	56.50	.27	Deer	(45%)
%	(96.35)	(1.57)	(.50)	(0)	(1.62)	(.00)	Elk	(19%)
							Bison	(18%)
Millville	6241.00	36.00	13.0	0	35.00	1.00	Deer	(66%)
%	(98.67)	(.57)	(.21)	(0)	(.55)	(.00)	Elk	(28%)
Mero	277	0	0	0	87.00	0	Deer	(55%)
	(76)	(0)	(0)	(0)	(23)	(0)	Beaver	(21%)
							Sturgeon	(20%)

all of these sites shared a number of mammal species in common such as deer, beaver, muskrat (except Mero), elk (except Mero), Cooper's Shore and Millville added several more mammal, bird and particularly pelecypod species (Table

Great variation among sites was also found in the utilization of pelecypods and waterfowl Since all of the sites were located near rivers or other bodies of water, aquatic mammals, waterbirds, and pelecypods might be expected to occur with some frequency. Mammals such as beaver, muskrat, otter, and mink did occur often, but only at Cooper's Shore and Millville were waterfowl relatively common (sixteen species at Cooper's Shore and six at Millville). Also, a relatively large number of pelecypod species characterized Millville (fifteen) and Cooper's Shore (fourteen). While birds and pelecypods accounted for less than 2% of the estimated pounds of meat when combined, they serve to illustrate variations in resource utilization among sites (Lippold 1971:142).

It cannot be denied that the number of resources utilized by the Cooper's Shore inhabitants are a reflection of a general resour abundance near the site. However, another variable which has some bearing on the diversity in resource utilization is related to the season and duration of site occupation. Sites which appear occupied for a longer duration of time such as Millville and Cooper's Shore record a higher species total and are consequent characterized by a wider resource utilization than sites which appear seasonally occupied.

The condition of diminished species variation undoubtedly rests upon the fact that all resources are not available at all times durin the year. Therefore, it is not unlikely that a seasonally restricted occupation would then

reflect a more restricted sample of an area's resources. The Mero site is an excellent example of this lack of species variety and all the evidence seems to suggest that its occupation was on a seasonal basis (Cleland 1966).

In conclusion, then, it would appear that Middle Woodland as a period seems to be characterized by different types of sites based on various resource utilization. Some sites appear to have been base camps such as Cooper's Shore and Millville while others revealed the characteristics of collecting stations and appeared seasonally utilized such as Mero.

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BOOK REVIEW

imals Utilized by Woodland Peoples Occupying e Apple Creek Site, Illinois. Paul W. Parmalee, dreas A. Paloumpie and Nancy Wilson. *Illinois ate Museum Reports of Investigations,* No. 23. 72. 62 pp. Photographs and Tables. $3.00 aper).

This publication lays another brick in our undation for understanding the lives of Wood- and peoples living along the lower Illinois iver Valley.

The study represents an analysis of 6,728 lluscan shells and 105,640 osteological samples llected from the Greene County, Illinois, site lmost ten years ago. Although many Woodland eoples utilized this site, its major occupation as by Pike-Hopewell and White Hall cultures 200-700 A.D.).

The taxonomic groups examined were mollusks, ish, amphibians, reptiles, birds, and mammals. hese were "broken down" into the species repre- ented and their numbers. Perhaps the most nteresting segment is that devoted to the ioenergetic questions of food potential and tilization. It comes as no surprise that the hite-tailed deer represented the greatest bio- ass utilized by these peoples. The high numbers f fishes (especially catfish and "rough fishes"), ussels, aquatic turtles and birds indicate a reat reliance on the surrounding aquatic envir- nment.

This publication will be of interest to many ologists, anthropologists and archeologists. t is on the whole well written, quite informa- ive and certainly fulfills an important goal of he Illinois Valley Archaeological Program.

Max A. Nickerson
Vertebrate Division
Milwaukee Public Museum

THE BOOKSHELF

BOOK NOTICES

The Jivaro. Michael J. Harner. Doubleday/Natural History Press, Garden City, 1972. 233 pp. 31 fig $7.95 (Cloth).

The Jivaro, inhabitants of the tropical rain forests at the foot of the Andes in eastern Ecuador are famous in the literature of anthropology for their fierce independence (they are the only American Indian group to have carried out a successful revolt against the Spanish Empire and to have repulsed all subsequent efforts at reconquest), for their warlike character, and, especially, for the exotic practice of gathering as war trophies, human heads, which are skinned and shrunken. Despite their fame, however, only two serious major ethnographic works have been written on the Jivaro (by Rafael Karsten in 1935 and by Mathew W. Stirling in 1938), and both are inadequate by modern standards. The author set out to rectify this situation in 1956 when he went to dwell among Jivaro groups beyond the current frontier of colonization where they are still unconquered and living still in the traditional way. This volume, part of the results of Harner's 14 month field stay, is a more or less conventional ethnographic account of the Jivaro written in a scholarly but not too technical fashion. The book seems to be directed toward a general adult audience, and no doubt will find acceptance as a text in college level anthropology courses. It is the first readily available account in English about these unique aboriginal peoples of South America.

THE PHOTO ALBUM

HEAD OF A BIRDSTONE

Pop-eyed type of banded slate. Length 2 3/4 in. Found in Lincoln county, Wisconsin during road-building operations. Donated to the Milwaukee Public Museum by the Wisconsin Archeological Society.

BASAL FRAGMENT OF A POSSIBLE TRUE FOLSOM POINT

Chalcedony. Dimensions unavailable. Reportedly found in Chippewa county, the first so far reported from this area of Wisconsin (See *Wisconsin Archeologist* 50(4):209). Phil Wiegand collection.

NEWS AND COMMENTS

With this issue, the editorship of *The Wisconsin Archeologist* formally passes from the hand of Robert E. Ritzenthaler into those of James B. Stoltman. Dr. Ritzenthaler first assumed the editorship in 1953 and has served in that capacity for twenty years. His decision to relinquish the duties of editor follows on the heels of his retirement from his position as Curator of Anthropology at the Milwaukee Public Museum. During h tenure as editor, Dr. Ritzenthaler was responsib for a number of innovations in the journal that have greatly increased its quality and popularit Most notable of these were the introduction of "The Collector's Corner" and "Interesting Wisconsin Specimens" columns in 1955 and the redesigni of the cover in 1956. Besides this, he contributed over 50 articles of his own to the journal In recognition of and gratitude for his distinguished service to the Society, Dr. Ritzenthaler was awarded a special bronze Editorship Plaque and a Life Membership in the Society at the annu Christmas dinner meeting on December 11, 1972.

This issue introduces a number of changes in the journal. The most significant difference between this issue and prior ones is that we hav employed a new printer, American Printing and Publishing Co., Inc. of Madison, Wisconsin. The decision to seek a new printer had been tentatively made and bids solicited prior to my assum the duties of editor. My first task as editor-designate was to solicit additional bids and, on this basis, to recommend to the Society the prir whom I felt could provide the best quality work at a reasonable price. This I did at the October 1972 meeting, and the recommendation was accepte

As a direct result of this decision, two changes in the format of the journal occurred. First, the size of the journal has been reduced somewhat from its former 6" by 9" size to its

present 5½" by 8½" size; the reason for this is purely economic: 5½" by 8½" is the standard size of the paper used by the new printer and to retain the old size would require an added expense for cropping. Second, a gloss paper replaces the old matte paper in a move, along with the added expertise of the new printer, to increase the quality of reproduction of photographs in the journal.

Other changes in the journal are minor, but perhaps it is desirable here to point them out explicitly and to explain them. A simple change in the cover extends the color coding of each issue around the edge so as to be visible when standing or lying on a shelf. This, hopefully, will ease the burden of the reader who is seeking a specific back issue from among his collection of *Wisconsin Archeologists*. Two other changes are nothing more than retitling two established features of the journal. The *News and Comment* title replaces "The Collector's Corner", but otherwise is basically the same. This section provides the editor with a convenient vehicle by which news (e.g. where excavations are being conducted in the state, when private collections may come up for sale, the current status of state or federal legislation concerning archaeology, etc.) and comments (e.g. letters to the editor) of interest to the membership may be disseminated. *The Photo Album* title similarly replaces "Interesting Wisconsin Specimens", but will continue to serve the function of publishing photographs of interesting artifacts from the state of Wisconsin about which the publication of a separate article is not really warranted. The title of this feature has been changed to emphasize that photographs of sites, mounds, excavations in progress, and other things of interest besides just artifacts might appropriately be published in this section of our journal. In this regard I appeal to all members of the

Society to assist in making this a worthwhile feature of the journal by submitting appropriate new photographs to the editor for inclusion in it. If you are unable to get a specimen photographed or are uncertain whether or not your collection contains noteworthy specimens, please feel free to write the editor for assistance. A final change occurs under *The Bookshelf* where, besides the norma "Book Reviews", will appear a new feature, "Book Notices". Under "Book Notices", a capsule summary of each book received (but not rendered the full review treatment) will be provided. Basically, the policy as to which books will be reviewed has not changed. Rather, it is intended that this new feature will provide readers of the journal with expanded coverage of pertinent publications that have normally been listed only by title under "Books Received" in the past.

Finally, I should like to emphasize that in no way should the above changes be construed as a rebuff or a revolution against the editorial policies of my predecessors. I have assumed my duties as editor grateful for the firm foundation laid by my predecessors and, like Bob Ritzenthaler before me, I commit myself to the belief that *The Wisconsin Archeologist* should not stand pat, but should continue to grow in quality.

AUTHOR INFORMATION

The Wisconsin Archeologist publishes original articles dealing with the anthropology (ethnology, physical anthropology, archeology) of the state of Wisconsin and adjoining regions of the United States and Canada. Articles of general topical and/or theoretical interest will also be considered.

All manuscripts submitted for publication must be typed on good quality, non-corrasable, 8½ by 11 inch white bond paper. Typing is to be on one side only, double spaced throughout, with at least one inch margins on all sides. Abstracts of up to 150 words are required. To be most informative, abstracts should emphasize what was learned or concluded as well as what was done. *No footnotes are permitted.* References to literature sources are to be included in parentheses within the text in standard anthropological style with the author's surname, date of publication, and pagination or other information. See examples in this issue. In a References Cited section at the end of the manuscript only those sources actually cited in the text are to be included. These are to be arranged alphabetically by author. For examples of typical bibliographic entries under References Cited, examine the papers in this issue.

All illustrations, including maps, line drawings, and photographs, will be published as Figures to be numbered consecutively in a single series (Fig. 1, Fig. 2). Tabular materials will be published as Tables and numbered consecutively in a different series than the Figures (e.g. Table 1, etc.). Both figures and tables must be provided with titles or captions and must be cited by number in the text. All illustrations must be submitted as black and white line drawings or as glossy prints, preferably in 8 by 10 inch sizes but no smaller than 5 by 7 inches. Be sure that photographs are sharp, clear, and have good contrast and that all illustrations are provided with a scale and/or a directional indicator where appropriate.

Authors should submit an original copy and retain at least one copy for themselves. Twenty reprints of each article will be provided free to each author.

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Entered as Second Class Matter at the Post Office at Milwaukee Wisconsin, 53201. Office of Publication, P.O. Box 1292, Milwaukee, Wisconsin, 53201.

THE
WISCONSIN
ARCHEOLOGIST

Volume 54, Number 2
New Series

JUNE 1973

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"NEW ARCHAEOLOGY" AND THE OLD COPPER CULTURE

William P. McHugh
University of Wisconsin-Milwaukee

ABSTRACT

Lewis Binford's article "Archaeology as Anthropology" (1962) has recently been republished in two collections of readings in archaeology, in Binford's own volume of his works, and in one reprint series. This paper, for the first time, critically reviews Binford's article and his application of a particular "systemic approach" to the Old Copper and later Woodland cultures of the midwestern United States. His explanations of the origins, form, function, and change in form of the copper objects are challenged on methodological, empirical, chronological and logical grounds.

INTRODUCTION

In an article entitled *Archaeology as Anthropology*, Lewis Binford (1962) criticized traditional archaeological theory and methodology as being inadequate to explain the processes of culture change. In this article, Binford outlined the methodology of what he termed a *systemic approach* to the analysis of archaeological data. To demonstrate the explanatory potential of his approach, Binford applied it to the Old Copper culture in an attempt to explain (1) the origins and primary role of the Old Copper copper implements and (2) their postulated shift in form from utilitarian to nonutilitarian between Late Archaic and Early Woodland times.

A review of Binford's article is appropriate at this time because it has not been previously reviewed in print and because it has recently been republished four times (see Fagan 1970, Deetz 1971, Binford 1972, and Bobbs-Merrill reprint series). Brian Fagan introduced Binford's article with the following statement:

> American archaeology has always been closer to anthropology than to history, and so American archaeologists seem to explain their data in anthropological rather than historical terms. The following paper by LEWIS R. BINFORD argues that archaeology should increase its efforts to contribute to anthropology as a whole since the structure of an entire cultural system is reflected in its material culture. Binford demonstrates the applicability of this premise with an example from eastern North America (1970:325).

James Deetz introduced Binford's article with this statement:

> in this classic of the new approach to archaeology as part of anthropology, Lewis Binford applies his methods and theories to a case, the Old Copper Culture of pre-historic North America. Binford rethinks the problems inherent in assigning function to the artifact. He describes three major functions: technomic, socio-technic, and ideo-technic, and employs these distinctions to the changing use of copper in eastern North America. The fact that function serves on three levels, often concurrently, is a sobering thought and merits further investigation, particularly since function is a loaded term within the general field of archaeology (1971:248).

Recently, Binford admits some empathy for critics of the terminology employed in the article, but he contends that his point that "all material items did not function in a single material subsystem of the extinct culture: was valid (1972: 17).

Binford's article generated no published criticism in the years immediately following its publication and, in fact, was seldom cited by other authors. However, in 1967, Creighton Gabel briefly summarized Binford's "systemic approach" and said, "it has great potential value when we try to probe non-technological aspects of culture" (1967:57). Furthermore, Gabel suggested that "the type of reasoning" employed in Binford's approach "could be fruitfully applied in other parts of the world, for example to the British Neolithic ax trade" (1967:57).

In view of these recent reprintings of Binford's article, its characterization as a "classic" by Deetz, and Gabel's endorsement of the methodology espoused, a review of the article is long overdue. The specific purpose of this paper is to review and evaluate the application of Binford's "systemic approach" to the Old Copper and Woodland data. A brief summary of his theoretical framework will be followed by a review of its application and an evaluation of its explanatory utility in the case Binford selected. Only publications which were available to Binford when he wrote his paper are employed in the evaluative sections of this paper.

BINFORD'S "SYSTEMIC APPROACH"

For Binford, archaeology is part of the broader discipline of anthropology, the field which strives "to *explicate* and *explain* the total range of physical and cultural similarities and differences characteristic of the entire spatial-temporal span of man's existence" (1962:217). Binford contends that archaeology has made "essentially no contribution in the realm of explanation" because archaeologists "do not conceive of archaeological data in a systemic frame of reference" (1962: 217). He cites the recurrent use of historical explanations in archaeological constructs. Binford finds traditional

archaeological theories and methods inadequate to the task of making processual explanations.

Following his criticism of American archaeology, Binford offers what he calls a "particular systemic approach in the evaluation of archaeological assemblages" and he uses this approach "in an attempted *explanation* of a particular set of archaeological observations" (1962:218).

The basic premise of Binford's methodology is summed up in the following statement:

> The formal structure of artifact assemblages together with the between element contextual relationships should and do present a systematic and understandable picture of *the total extinct* cultural system (1962:219).

He then goes on to distinguish three categories of artifacts—the technomic, the socio-technic, and the ideo-technic. The technomic artifacts have as their primary function coping directly with the physical environment. "Variability in the technomic components of archaeological assemblages is seen as primarily explicable in the ecological frame of reference" (1962:219). The socio-technic artifacts consist of material items having their "primary functional context in the social sub-systems of the total cultural system," in articulating individuals with each other in "cohesive groups capable of efficiently maintaining themselves and of manipulating the technology" (1962:219). The ideo-technic artifacts are those said to function primarily in the ideological component of the cultural system. Binford considers the diversity of classes of items in this category to be "related to changes in the structure of the society" and says that explanations of this diversity "must be sought in the local adaptive situation rather than in the area of 'historical explanations'" (1962:220).

Having identified these artifact categories and an additional category of cross-cutting stylistic attributes, Binford then turns to the specific case of the Old Copper complex which he says, "has been frequently cited as a case of technological 'devolution'" from a stage of finely wrought utilitarian tools of copper to a stage, reached during the Early and Middle Woodland periods, in which production of nonutilitarian copper objects was characteristic (1962:220). Binford proposes to

> explore this interesting situation in terms of: (1) the frame of reference presented here, (2) generalizations which have previously been made concerning the nature of culture change, and (3) a set of hypotheses concerning the relationships between certain forms of socio-technic artifacts and the structure of the social systems they represent (1962:220).

THE NONUTILITARIAN NATURE OF THE COPPER ARTIFACTS

From the foregoing quotation, it is clear that Binford was obliged to identify the copper artifacts as belonging to

his socio-technic category. He does this by attempting to show that they could not have functioned primarily in his technomic realm. He points out that because of the great expenditure of time and effort in acquiring the copper and fashioning the copper artifacts, they were less adaptively efficient in terms of energy expenditure and exploitative efficiency than their unspecified bone and stone counterparts. Therefore, Binford doubts that the copper tools could have been technologically more efficient than their counterparts of bone and stone.

Binford poses the hypothesis that the superior durability of the copper tools may have been a compensatory factor justifying the great expenditure of time and energy for their manufacture. Then he disposes of the durability hypothesis on two grounds: (1) if the copper tools were technologically more efficient than their bone and stone equivalents because of their superior durability, they should show evidence of re-use after being broken or after becoming worn out. Yet, according to Binford, battered and used pieces are characteristic and reworked pieces are uncommon or unknown (1962:221). For Binford, the apparent lack of 'factory-fresh' copper tools is indicative of their lack of functional durability. However, it can reasonably be suggested that the preponderance of used and battered specimens indicates the long-term durability of the copper tools. (2) If the copper tools were more durable than their stone and bone equivalents, then they should have been retained in the functioning technology and should not have been disposed of in burials. According to Binford, "when found in primary archaeological context, copper tools are almost invariably part of burial goods" (1962:221). It can be shown that this statement is inaccurate.

Let us look at the distribution of the copper tools. In his typological and distributional study of some 2600 Wisconsin Old Copper copper artifacts, Wittry (1951:2) points out that "except for a few dozen, all the Old Copper pieces were picked up individually—in plowed fields, sand blows and areas of soil erosion." At the time of Wittry's analysis, only one site of the Old Copper culture, the Osceola site, had been excavated (Ritzenthaler 1946).

The Osceola site is located on the Mississippi River in southwestern Wisconsin, well removed from the focus of Old Copper artifacts in eastern Wisconsin (Wittry 1951:fig. 4). Ritzenthaler reported the discovery of copper and stone artifacts and pottery from an area with many burials. Of these artifacts Ritzenthaler says, "The artifacts were scattered through the bundle-burial layer, in some cases associated directly with a burial, but in most cases unrelated (1946: 55-56). Thirty-nine copper artifacts are listed in Ritzenthaler's inventory of artifacts from Osceola, but their specific provenience is not reported. The Osceola site hardly presents the kind of associational data Binford's approach requires.

A second excavated Old Copper site from Wisconsin is that located at Oconto, near Green Bay in northeastern Wisconsin. In their 1952 report on the Oconto excavations, Ritzenthaler and Wittry note that of 26 copper artifacts, only nine were associated with 21 single and multiple burials and eight cremations which together included a minimum of 45 individuals recovered from the site (1952:Appendix A). Ten copper awls (or parts thereof), one copper point, and one copper rivet were found in the upper part of the yellow sand layer which produced evidence of occupation in the form of scattered post holes (Wittry and Ritzenthaler 1957:313). The remaining five copper specimens from the Oconto site belong to a private collection and had no specific associational data. Of the copper implements associated with burials, one, a copper crescent, is associated with the skeletal remains of a child. Two chipped stone points, a chipped stone scraper, a swan humerus whistle, a fish jawbone awl, two antler tips, and 14 perforated snail shells were also associated with the burials. The distribution of copper artifacts at Oconto does not support Binford's contention that *in situ* copper tools are "almost invariably" associated with burials.

The third and last possible Old Copper site which could have supplied data for Binford's analysis is the Reigh site near Lake Butte des Mortes in east central Wisconsin. It was initially excavated by Baerreis, Daifuku and Lunsted (1957) and was subsequently excavated by Neil Ostberg (1956, 1957) and others (see Ritzenthaler 1957). Uncovered here were at least 39 separate burials involving 63 individuals. Grave goods accompanied 22 individuals, including 13 with copper artifacts of types normally assigned to the Old Copper Culture. Most if not all of the copper artifacts found in undisturbed deposits at the Reigh site were undeniably found in association with burials, which would seem to support Binford's contention; however, it should be pointed out that there was no evidence of middens, pits or other signs of Old Copper habitation at the site. As a purely cemetery site, the Reigh site, by itself, cannot be used to test Binford's proposition that copper artifacts of the Old Copper culture are primarily found *in situ* only with burials. After all, there is no other undisturbed context at the site in which to find artifacts of any kind.

Moreover, Binford has ignored or glossed over the fact of the overwhelmingly extra-burial distribution of Old Copper artifacts (Wittry 1951). Does he seriously suggest that most or all of the thousands of surface finds of Old Copper artifacts in the Upper Great Lakes region were originally associated with burials? This seems to me to be a completely untenable position, particularly in light of the evidence cited above from the Oconto and Osceola sites.

In a curious bit of logic Binford (1962:221) observes that "evidence of use is a common characteristic of recovered specimens" and takes this as supporting his contention that

such artifacts served primarily as status symbols rather than as conventional tools. To the contrary, I suggest that the most economical and reasonable interpretation of these data, namely that most Old Copper artifacts have been found unassociated with burials and that many, perhaps most, show evidence of use, is that Old Copper artifacts functioned primarily in the technomic realm.

The foregoing summary of the distribution of copper artifacts in the principal Old Copper sites in Wisconsin makes it clear that copper tools, when found in primary archaeological context, are *not* almost invariably associated with burials.

THE INITIAL APPEARANCE OF COPPER TOOLS

"I suggest that the Old Copper copper tools had their primary functional context as symbols of achieved status in cultural systems with egalitarian system of status grading" (Binford 1962:223). Binford attributes a band level of socio-cultural integration with an egalitarian system of status grading to the Old Copper Indians. He suggests the primary function of the copper artifacts was as socio-technic items.

> Having reached this 'conclusion,' we are then in a position to ask, in systemic terms, questions concerning their period of appearance, disappearance, and shift to nonutilitarian forms of copper items among later prehistoric socio-cultural systems of eastern North America (1962:223).

Binford explicates the initial appearance of formally "utilitarian" copper tools in the Great Lakes region in terms of a postulated major population expansion following the Nipissing stage of the ancestral Great Lakes. "The increase in population density was the result of increases in gross productivity following an exploitative shift to aquatic resources during the Nipissing stage" (1962:223).

According to Quimby and Griffin (1961:115-16) the Nipissing high water stage dates to about 2200 B.C. "It seems possible, indeed probable, that the Old Copper sites along the Keweenaw waterway antedate the maximum level of the Nipissing stage water plane in this area" (1961:113). Quimby and Spaulding report that some Old Copper artifacts were recovered from levels lower than that of the Nipissing high water level and believe that the Old Copper culture was essentially pre-Nipissing (1957:200). Thus, in 1961, there seems to have been a concensus that at least the earlier Old Copper sites were of pre-Nipissing age (see Endnote). The conclusion is obvious: if, as seems to be the case, the earliest Old Copper sites antedate the Nipissing high water stage, the initial appearance of copper artifacts in the upper Great Lakes cannot be explicated by a population expansion that is correlated with a hydrological

event dated several centuries later than the appearance of the copper tools.

We might also point out that the evidence for the "exploitative shift to aquatic resources" is anything but conclusive. His evidence for the increased exploitation of aquatic resources is "the initial appearance of quantities of fish remains' in sites, which he fails to identify physically, *following* the Nipissing high water stage and the location of these sites at loci from which aquatic resources could be exploited (1962:223). Such sites, even if we could figure out which ones he has in mind, would simply be too late in time to provide the evidence Binford needs to show a correlation between the *initial* appearance of copper artifacts and the postulated "exploitative shift to aquatic resources."

Nowhere does Binford formally compare the Old Copper assemblages with each other or with the later Woodland assemblages. He violates his own dictum, "that explanations of differences and similarities between archaeological assemblages as a whole must first consider the nature of the differences in each" of his three major categories of cultural items (Binford 1962:220). Moreover, by neglecting to analyze the Old Copper copper artifacts for their typological and functional diversity, Binford has failed to demonstrate the presence of copper implements which could have served as fishing equipment. His failure to consider the significance of the morphological variability within the copper artifacts and the variability between and among the Old Copper assemblages is surely a methodological deficiency. Within a systemic framework, it is impossible to reconcile Binford's treatment of the primary archaeological data with the foregoing quotation.

THE POSTULATED SHIFT IN FORM OF THE COPPER ARTIFACTS

Binford posulates that copper artifacts underwent a change in form following the Archaic stage and that there was a decline in the manufacture of copper tools in the Great Lakes region.

> The failure to perpetuate the practice of the manufacture of copper tools on any extensive basis in the Great Lakes region should be explicable in terms of the changing structure of the social systems during Woodland times. . . . I would suggest that there was a major structural change between the Late Archaic and Early Woodland periods, probably in the direction of a simple clan and moiety basis for social integration with a corresponding shift in the systems of status grading and the obsolescence of the older material means of status communication (Binford 1962:223).

What is the basis of Binford's characterization of the social systems of the Woodland cultures? I suggest it is based, consciously or unconsciously, on constructs already present in the literature. In *Indians Before Columbus*, Martin Quimby, and Collier suggested that the Adena peoples were agriculturists and hunter-gatherers who lived in villages of substantial structures, traded widely for exotic materials (copper, mica, marine shells), and constructed "tremendous burial mounds the size of which implies a social structure capable of organizing co-operative labor projects on a large scale" (1947:266). For the Ohio Hopewell Indians, the same authors said that "there were probably privileged classes of people, elaborate rituals, special guilds of craftsmen, widespread trade and commerce, and a social organization capable of directing co-operative labor" (1947:277).

In 1955, Albert Spaulding suggested that the Archaic peoples were simple hunters and gatherers whose social organization he made no attempt to characterize. According to Spaulding, the burial mounds and habitation site refuse of the Adena culture revealed

> a culture which is of quite a different order from that of the Archaic people. . . .
>
> On the basis of the sheer size of the mounds . . . and the complexity of the mortuary practices associated with them, we can safely infer a complex social organization and an efficient economic base (1955:19-20).

It is clear that the primary evidence used for characterizing the social systems of the Woodland Adena and Hopewell cultures is the mortuary evidence and burial associations.

Since Binford has not presented the empirical evidence on which he bases his characterization of the Woodland social systems, one can only assume that he is relying on interpretations which prevailed in the discipline. Binford accepts the general view of a more complex kind of social organization for the Woodland societies, which is based on mortuary practices and burial goods, and then explicates the shift in the form of one class of grave goods—the copper items—on the basis of a change in the pattern of social organization. The circularity of Binford's reasoning is obvious.

It is, of course, possible that some of the copper artifacts in the Woodland cultures functioned primarily in nonutilitarian areas. It should be pointed out, however, that while some of the Old Copper copper types do not persist in the Woodland cultures, copper axes, adzes, and awls are present in the Adena, Hopewell, and Effigy Mound cultures (Morgan 1952:86-87, 89; Deuel 1952:262; Bennett 1952: 114; Martin, Quimby and Collier 1947:265, 270, 293, 304, 306). The point here is that formally utilitarian copper tools did not "disappear" following the Archaic period, and their primary functional context may indeed have been in the

technomic realm.

Even allowing, as Binford suggests, that "the presence of copper tools of essentially nonutilitarian form within such complexes as Adena, Hopewell, and Mississippian are most certainly explicable in terms of their socio-technic functions within much more complex social systems" (1962: 223), this "explication is nothing more than an historical type of explanation. What Binford has done is simply chronicle, on the hypothetical level, the association of essentially nonutilitarian copper artifacts and one kind of social organization (the Woodland conjunction) as having replaced the association of formally utilitarian copper artifacts with a simpler type of social organization (the Archaic conjunction). Since Binford has failed to demonstrate any cultural and biological continuity between the Archaic Old Copper culture and the Woodland cultures, his explanation can hardly be considered to be of the processual type.

THE EXPLANATIONS OF BINFORD'S SYSTEMIC APPROACH

Binford lists the following five problems which he says his "explanatory 'theory'" has the advantage of explaining:

> (1) the period of appearance of copper and probably other 'exotic' materials in the Late Archaic period; (2) the form of the copper items; (3) their frequently noted contextual relations, for example, placement in burials; (4) their disappearance, which would be an 'enigma' if they functioned primarily as technomic items; and (5) the use of copper for the almost exclusive production of 'nonutilitarian' items in later and certainly more complex cultures of the eastern United States (1962:223).

We will briefly review his "explanations" of these five problems.

While there exists some disagreement as to the age of the Old Copper cultures (e.g. Quimby 1960; Griffin 1961), there is general agreement that the earliest Old Copper copper tools pre-date the Nipissing high water stage. Therefore, the initial appearance of copper artifacts in the upper Great Lakes occurred before the requisite ecological and demographic conditions posited but undemonstrated by Binford came into being. Consequently, it can be concluded that Binford has not explained the appearance of the copper artifacts.

In stating that his theory explained the form of the copper artifacts, I believe that Binford means that the formally technomic copper forms (i.e., utilitarian copper artifacts with practical, everyday applications) were elevated to the status of social indicators, that they functioned primarily in his 'socio-technic' realm and that

their presence in the Old Copper assemblages is only understandable in this context. This interpretation is based on Binford's contention (1) that the Old Copper copper artifacts, when found in primary archaeological context, are almost invariably associated with burials, and (2) that the copper tools are less efficient, less durable, and more costly to produce than their unspecified bone and stone counterparts. As we have shown, the Old Copper copper artifacts from primary archaeological context do NOT come mainly from burials. The Old Copper assemblages surely lack obvious bone and stone counterparts for many if not most of the copper forms. The scarcity of copper artifacts in Old Copper burials draws no comment from Binford but suggests to me that they may have been generally too valuable for inclusion in burials. Their scarcity in burials, in fact, may be indicative of the presence of mechanisms which promoted their retention by the living rather than assignment to the dead.

If, as Binford suggests, the Old Copper artifacts functioned as indicators of achieved status, one wonders about the association of a crescentic copper knife with an infant burial at the Oconto site (Ritzenthaler and Wittry 1952). In addition, Binford ignores the distribution of the copper artifacts according to the sex of the associated individuals; this information was available for a number of the Reigh site burials (see Baerreis *et al* 1957 and Ostberg 1956, 1957). In sum, Binford has demonstrated neither the inferior durability of the copper tools when compared to their "equivalents" in other materials nor the reason for their placement in burials.

The so-called "disappearance" of utilitarian copper artifacts in the Woodland cultures turns out to be nothing of the sort. Some of the copper tools present in Old Copper persist into Woodland and later times. To be sure, in the Adena and Hopewell cultures, the utilitarian types of copper artifacts become reduced in proportion when compared to nonutilitarian copper types. This is Binford's "shift" in the nature of copper artifacts from Archaic to Woodland times. He explains this "shift" in terms of a change in the status grading systems away from the egalitarian system of the Archaic peoples in which copper artifacts served as indicators of achieved status to a grading system of the Woodland peoples in which nonutilitarian copper artifacts became symbols of ascribed status.

The primary reason for suggesting that the Adena and Hopewell cultures had a more complex social system than the earlier Archaic cultures is probably their mortuary practices. This long-standing and widespread interpretation was surely known to Binford and is, perhaps, an implicit assumption in his systemic model. It would appear that the prevailing concensus of the complexity of the social systems of the Adena and Hopewell peoples encouraged Binford to "explain" the shift

from the utilitarian to the nonutilitarian form of copper grave goods (only a minor part of the burial goods at any period) in terms of changing social structure and systems of status grading. In other words, if the above appraisal is accurate, some of the same archaeological evidence (copper objects in burials) which has contributed to the characterization of the advanced social complexity of the Adena-Hopewell cultures has been "explained" by Binford as status indicators among peoples with more complex social systems, systems in which ascribed statuses predominated. The logic is simple and circular. If the copper grave goods in the Woodland cultures are indicative of a more complex social system, their presence in Woodland burials cannot be properly *explained* as the result of a more complex social system.

In summary, we suggest that Binford's "explanatory 'theory'" explains not one of the five problems he lists (1962:223). Therefore we can hardly accept his statement that "only within a systemic frame of reference could such an inclusive explanation be offered. Here lies the advantage of the systemic approach" (1962:224).

CONCLUSIONS

This review has attempted to show that the particular application of Lewis Binford's systemic approach to the Old Copper and later Woodland cultures is inappropriate and offers no important new insights concerning the archaeological evidence. The theoretical framework of this approach is intriguing, and certainly his broad goal of finding a way archaeology can contribute to the general field of anthropology is laudable.

As pointed out in the beginning of this review, Binford's *Archaeology as Anthropology* drew no published review or criticism when it was published a decade ago, and it was seldom cited in other publications in the first years after its publication. Then, in the course of less than two years, it has been reprinted four times and has been called a "classic" by one author.

The question is why? If the systemic approach Binford formulated was so useful, why didn't he and the others use it on other sets of archaeological data? If the utility of this approach is confined to the particular case selected by Binford, that is, if its explanatory powers work only for the Old Copper and later Woodland cultures of the upper Midwest, it remains, at best, only a particularistic historical explanation with little if any importance to processual archaeology and general anthropology. Even in the particular case selected by Binford, the results of the application of his approach are largely suspect.

The manifold difficulties in properly applying Binford's systemic approach were probably apprent to potential users.

For instance, Binford himself pointed out that his three categories of artifacts as well as his correlations of status symbols and types of social organization needed to be tested against ethnographic data (1962:219, 220, 223). This would be a formidable task in itself, one apparently undertaken by Binford and his students with unsuccessful results (Binford 1972:17). Since the demonstration of his artifact categories and artifact-social system correlations are crucial to Binford's systemic approach, it is little wonder that it has not been widely employed.

Returning to the quoted endorsements of Fagan and Deetz presented at the beginning of this review, we cannot agree with Fagan when he says that Binford "demonstrates" the applicability of the premise that "the structure of an entire cultural system is reflected in its material culture." Although Binford does say this, his biased selection of the archaeological data and his specific problem orientation clearly shows that he is not dealing with the total cultural systems of the archaeological cultures he chose for his exposition. For instance, although Binford defined the ideological component of the total cultural system, he completely avoided this area in his analysis.

As for Deetz' endorsement, I agree that Binford's notion of the multiple functioning nature of artifacts "merits further investigation." The Greeks were apparently well aware of this quality when they presented the horse to the Trojans. We are all probably aware of the multi-functioning of a Cadillac. Binford's idea of the multiple functioning nature of prehistoric cultural remains is not only potentially useful but may be essential to the understanding of prehistoric cultural processes. Unfortunately, he has not demonstrated this in the case of the Old Copper and later cultures of the upper Great Lakes region.

ENDNOTE

Recently, James B. Griffin has said, "There is increasing evidence, however, that although some of the sites with this [Old Copper] tool complex may go back as far as 3000 B. C., most of them are between the Nipissing and Algoma stages of 2200 to 1000 B. C. . . .

"The oldest apparently acceptable date for Old Copper tools is one recently obtained on charcoal from a site on Morrison's Island in the Ottawa River near Pembroke, Ontario (2750 ± 150 B.C., GSC-162)" (1965:664). It appears, then, according to evidence available in 1960-61 and more recent evidence, that the earliest Old Copper manifestations predate the Nipissing high water stage.

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COPPER CACHE AT PENETANGUISHENE, ONTARIO, CANADA

Wilfrid W. Jury
Middlesex College
University of Western Ontario, London

ABSTRACT

A cache of 26 tools of native copper, many of Old Copper types, one specimen of drift copper, five trade copper tools and ornaments, and four of iron was found on the site of a British Naval and Military Establishment (1817-1856) on a hill above Penetanguishene harbor, Ontario. Penetanguishene harbor, a southeastern arm of Georgian Bay, is in the area inhabited by the historic Huron Indians and center of European fur trade from the early 17th to the mid 19th centuries.

On may 29, 1968, a cache consisting of 26 pieces of native copper, one specimen of drift copper, five of trade copper and four of iron (Fig. 1) was discovered on the site of the Naval and Military Establishments (1817-1856) at Penetanguishene, Ontario, where, for the past several years, archaeological investigations and a reconstruction project have been carried on by the writer for the University of Western Ontario, sponsored by the Government of the Province of Ontario.

The find occurred on the first of three benches on a precipitous hill above the southeastern shoreline of Penetanguishene harbor, a southeastern arm of Georgian Bay. The land had not been disturbed by construction, lumbering or agriculture since the building of the Naval Establishment in 1817. Erosion and a dense growth of trees and shrubs had long since obliterated the old foundations.

The cache was uncovered three feet from the outer wall of a building identified on contemporary maps as that of the Naval Clerk-in-Charge and approximately five to six feet from a former pathway that appears on an 1829 naval plan on file in the Public Archives of Canada (Map Div. VI/440). Tinges of green copper oxide appeared first in the sandy soil at a depth of 18 inches. The objects were distributed apparently indiscriminately over an area two feet square to depths of 24 inches. Two kettles had been placed in the center, one inside the other, with five of the smaller artifacts inside the inner kettle (Fig. 1). No Indian remains

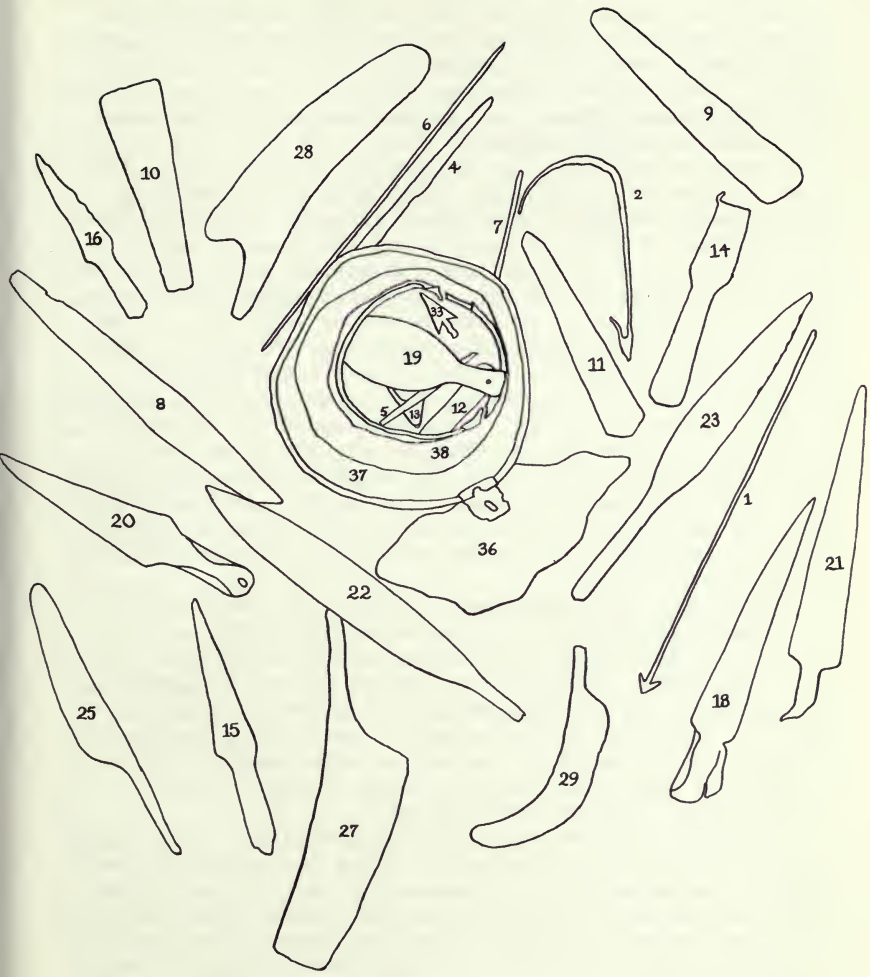

FIGURE 1
Horizontal Section Through Cache, 20 to 23 inches beneath top soil. Shallower and deeper artifacts (nos. 3, 17, 24, 26, 30, 31, 31, 34 and 35) not illustrated.

have been found in the vicinity. The pathway, however, could have been an ancient trail following the high dry land of the bench to the open water of Georgian Bay.

The 26 native copper artifacts in the cache are utilitarian and several show evidence of use. Exceptions are two socketed points of excellent workmanship with dull edges that suggest symbolic or ceremonial attributes (Fig. 2, B and C). The lanceolate socketed point is exceptionally well made with copper folded to form the base of the blade and the socket in perfect symmetry (Fig. 2, D).

Spear points (Figs. 2, 3), knives (Fig. 4), awls (Fig. 6, B, D), and celts (Fig. 5) resemble or are variants of those commonly documented in the literature of the Old Copper culture. Two unique copper tools may be a gouge and a pestle (Fig. 5, B, F). No comparable items have come to my attention. The curved knives resemble the Old Copper type B and D of Group II as defined by Wittry (1951:12). They differ from the majority illustrated from the Neville Park Museum by Mason and Mason (1967) in width and shape of blade, in degree of curvature, and in the morphology of the outer edge and tang. Red stains that appear on one knife (Fig. 4, B) are bright in shade and are not of red ochre. Two of the curved knives are similar in shape to late period specimens discussed by Quimby (1963:196-97) which were excavated in the Upper Great Lakes area. According to Quimby, these latter knives were associated with Iroquoian potsherds identified as

> Huron incised, Warminster Incised, and others that should be indicative of Huron or proto-Huron. It is possible that this pottery was not actually made and/or used by Huron Indians but was instead made by Huron influenced proto-Chippewa such as the Nipissing or Missisauga or some similar group. It is also possible that the pottery reached Isle Royale from Huron or proto-Huron sources through channels of trade (1963:195-96).

The tools and ornaments of trade material in the cache are not unusual (Figs. 6, 7, 8). Discs and arrowheads were made of discarded kettles and thin strips of copper in the early contact period (Griffin 1961:97; Quimby 1966:72) and iron arrow points, awls and fish spears were traded in quantities by the French in Huronia (Jury and Jury 1955; Kidd 1949:Pl. XLIX).

The two kettles (Figs. 9, 10) were fabricated similarly to a small kettle found in a burial at the Jesuit mission-fort of Ste. Marie, about ten miles distant, where the cemetery is dated 1642 to 1649 (Jury and Jury 1954:93, Pl. XXIII). The handle of the Ste. Marie kettle had disintegrated except for corroded remnants in the lugs. The lugs are copper, narrower below the rim than above, with one copper rivet in each. They are convex at base and straight with bent corners on the upper edges. (See Wittry 1963:fig. 12; Hayes 1965: Pl. 12). The Ste. Marie kettle was recovered from damp

alluvial sand beside the river Wye and is in a greater state of disintegration than the Penetanguishene kettles that were recovered from dry sand.

Speculation on the origin of this cache or its parts encompasses a wide range of possibilities in time-span and in peoples. More elusive is the motive behind its burial. Since the earliest contact period there have been continuous trade and blood relationships between the Penetanguishene district and those territories of the western Great Lakes where copper finds have been most frequent.

Penetanguishene harbor cuts into the heart of the country of the historic Huron, traditional travellers and barterers with early European contacts. Gift-giving was an important feature of their culture. Northern Algonkian groups came to these shores to trade and often wintered there.

In the early 17th century unknown numbers of French lived in and near their villages. Etienne Brule, travelling with Hurons, brought back a copper ingot from Lake Superior, and Grenoble in 1623-24 "had been trading among a nation towards the north, about a hundred leagues from us, getting copper from a mine" (Sagard 1939:135). Jean Nicolet "embarked in the Huron country, with seven Savages" as guides on his journey into Wisconsin territory (Thwaites XIII, 277).

Within 100 yards of the cache are the remains of the 18th century post of Charles Denys de la Ronde, brother of Louis Denys de la Ronde whose extensive plans to mine copper in Superior included transportation "to a River near Machidache" (southeastern Georgian Bay) and thence south to Lake Ontario (Coll. State Hist. Soc. of Wisconsin, XVII:313).

Further impetus to Indian commerce came with the establishment of a naval base in 1817 and a military post in 1828, the latter having moved from Drummond Island. With the garrison came the Indian Department, fur traders and voyageurs, all with long traditions in the old North West. Veterans of the Michigan Fencibles who spent the winter of 1814-15 at Prairie du Chien were granted land in Penetanguishene harbor. In November 1830 Lieutenant Governor Sir John Colborne estimated that some 6000 Indians visited Penetanguishene during the summer following the movement of the military post from Drummond Island (P.A.C., Ms. Div., R.C. 8, C, 1328:190-91).

Officers of the Navy made scientific collections of rocks and minerals and at least one military officer collected extensively in "aboriginal antiquities" making archeological explorations in the district. Nor can one preclude the possibility of theft at this isolated post where discipline was a recurring problem. The house of the Naval Clerk-in-Charge was probably occupied by army personnel after 1828.

Although copper *per se* was held in veneration by some Indians, copper artifacts have no mention in early works on the Huron nor do native copper items appear generally on

Huron sites. A somewhat similar cache, however, was found on the Forget site, a late precontact Huron village less than ten miles south of the Penetanguishene find (Jury 1965). That some copper tradition existed was proven by the presence of copper strips, rolled beads and partially made beads in Forget longhouses. Similar items are reported from the pre-Iroquoian Miller site situated to the south on Lake Ontario (Kenyon 1968). Possibly the larger, heavier and older copper pieces were held by Hurons in this later period as "technomic" status symbols with socio-technic or socio-religious significance (Binford 1962). Certainly the shapes of several of them resemble bone and stone specimens in use in the area. They probably reflect long-established intertribal relationships.

One cannot, therefore, reject the possibility that the native copper specimens had been the possessions of prehistoric Indians of the district nor that the cache was of historic Huron or Algonkian origin. It was my impression upon uncovering the find and studying its components that this interesting assemblage of copper and iron goods was the collection of a white man. The pieces were not bound, as was the Forget copper, nor in a pouch. Had the copper been hereditary or ceremonial Indian paraphernalia, trade pieces would probably not have been included. The disturbed area was shallow with no evidence of scooping. Although continual erosion has taken place through the centuries, the cache was found at the same levels as the long foundations of the Clerk's house built in 1817.

FIGURE 2

NATIVE COPPER SPEAR POINTS WITH OPEN SOCKETS*

A. No. 14 in Fig. 1 — Blade has been cut, not broken, as suggested by projection of twisted copper. One surface flat, one surface with ridge extending through socket. Socket oval in shape. Edges Sharp.

B. No. 17 (Not shown in Fig. 1) — One surface flat, one surface with slight ridge. Shoulders formed by folding of copper for socket. Shallow socket, ovoid in shape. Edges and point blunt.

C. No. 15 in Fig. 1 — One surface flat, one surface with slight ridge extending through socket. Edges blunt. Base bent. Socket oval shaped. Surface pitted, with longitudinal striations. Mottled green.

D. No. 19 in Fig. 1 — Lanceolate, flat surfaces bevelled to sharp edges. Oval shaped socket with expanding aperture. Circular perforation punched from inner surface of socket 0.5 cm. from base. Surface smooth, slight erosion on socket. Folding of copper slightly evident on under surface of blade. Excellent workmanship. Dark green.

E. No. 16 in Fig. 1 — Visible surface flat, other surface has slight ridge extending through socket. Edges sharp. Open socket rectangular in section. Deep longitudinal striations. Green oxidation.

F. No. 18 in Fig. 1 — Visible surface flat with median ridge on other surface extending through socket. Edges sharp. Angular shoulders formed by folding of copper for socket. One shoulder 0.3 cm.; one shoulder 0.6 cm. Socket probably oval, now bent. Surface smooth. Green oxidation.

G. No. 20 in Fig. 1 — Median ridge on both surfaces, extending through socket. Sharp edges. Socket oval in shape. Circular perforation punched 0.2 cm. from base. Slightly rough surfaces. Deep striations.

*See chart for dimensions of artifacts, p. 90.

DIMENSIONS OF COPPER SPEAR POINTS IN FIGURE 2

Letter Designate	Length of blade	Width at shoulder	Maximum thickness	Length of socket	Width of socket	Width of aperture	Maximum depth of aperture	Perforation diameter
A	5 cm.	2.5 cm.	0.6 cm.	6.5 cm.	1.9 cm.	1 cm.	0.5 cm.	
B	5 cm.	1.5 cm.	0.3 cm.	4.1 cm.	1.3 cm.	1 cm. to 1.4 cm.	0.2 cm.	
C	8.3 cm.	2.1 cm.	0.5 cm.	4 cm.	1.4 cm. to 1.6 cm.	0.8 cm. to 1.3 cm.	0.3 cm.	
D	8.2 cm.	4.1 cm.	0.3 cm.	3.8 cm.	1.3 cm. to 2 cm.	1.7 cm.		0.2 cm.
	Maximum bevelling = 1 cm.							
E	4.6 cm.	1.5 cm.		3.9 cm.	1 cm. to 1.3 cm.	0.7 cm. to 0.8 cm.	0.4 cm.	
F	12 cm.	2.8 cm.	0.5 cm.	3.9 cm.	1.5 cm.	ca. 1 cm.		
G	10 cm.	3 cm.	0.5 cm.	4 cm.	1.4 cm.	0.6 cm.		0.3 cm.

FIGURE 2

FIGURE 3

NATIVE COPPER SPEAR POINTS WITH FLAT TANGS

A. No. 24 (Not shown in Fig. 1) — Flat with bevelling on both surfaces. Sharp edges. Smooth. Blade has multiple striations. Tang shows evidence of poor annealing at folding for shoulders. Mottled green.

B. No. 21 in Fig. 1 — Flat, with bevelling on both surfaces. Edges sharp. Tang has slanting base, possibly broken. Surfaces eroded. Dark green.

C. No. 23 in Fig. 1 — Elongated lanceolate. Median ridge on both surfaces thinning to sharp edges. Straight tang tapering in thickness slightly to convex base. Smooth. Mottled green.

D. No. 22 in Fig. 1 — Elongated lanceolate with one weak shoulder. Double convex in section. Sharp edges. Blunt tip probably broken. Tang tapers in width and thickness to slightly slanting base. Surface smooth. Some erosion. Mottled green and blue-green.

DIMENSIONS

Letter Designate	A	B	C	D
Length of blade:	8.8 cm.	14.9 cm.	13.5 cm.	15.5 cm.
Maximum width:	2.8 cm.	3.3 cm.	2.7 cm.	2.8 cm.
Bevelling, maximum:	0.5 cm.	0.6 cm.		
Thickness:	0.3 cm.	0.4 cm.	0.4 cm.	0.5 cm.
Length of tang:	2.7 cm.	3.5 cm.	6.7 cm.	5.0 cm.
Width of tang:	1.2-1.3	1.2 cm.	1.2 cm.	1.7-0.6
Thickness of tang:	0.3 cm.	0.4 cm.	0.3-0.2	0.4-0.2

FIGURE 3

FIGURE 4

CURVED NATIVE COPPER KNIVES WITH FLAT TANGS

A. No. 28 in Fig. 1 — One surface bevelled at inner edge thinning to outer edge. Both edges sharp. Surfaces smooth, mottled green and in places bright green patination.

B. No. 27 in Fig. 1 — One surface with ridge 1 cm. to 1.5 cm. from inner edge, thinning to sharp edges. Pounding of copper evident on surface of tang. Surfaces smooth. Green and copper color with two bright red stains.

C. No. 29 in Fig. 1 — One surface bevelled 2 cm. to 3 cm. from inner edge thinning to sharp outer edge. Inner edges dull. Surface smooth.

D. No. 25 in Fig. 1 — Slight ridge on both surfaces of blade thinning to sharp edges. Surface smooth. Slight fractures possibly due to annealing.

E. No. 26 (Not shown in Fig. 1) — One surface with ridge 0.9 cm. to 1.2 cm. from inner edge thinning to sharp edges. Tang is fractured. Surfaces smooth with striations on blade. Green.

DIMENSIONS

Letter Designate	A	B	C	D	E
Length of knife:	16.7	13.8	11.5	14.6	10.0
Length of blade:	13.5	11.5	9.4	10.0	7.0
Max. width of blade:	3.8	4.0	2.4	2.5	2.6
Max. thickness of blade:	0.3	0.3	0.1	0.25	0.2
Bevelling:	.02-.05				
Max. width of tang:	1.7	1.5	0.8	0.9	0.5
Thickness of tang:	0.2-0.1				0.2

Measurements in centimeters

FIGURE 4

FIGURE 5

MISCELLANEOUS NATIVE COPPER OBJECTS

A. No. 8 in Fig. 1 — Problematical; ice pick? Rectangular in section. Hafting end is flattened with closed hook. Smooth surface.

Length: 18.6 cm.	Width of Hook: 0.5 cm.
Width at center: 1.8 cm.	Length of hook: 0.6 cm.
Thickness at Center: 1.2 cm.	

b. No. 13 in Fig. 1 — Problematical; Gouge? Sharp bit edge. Smooth surface. Mottled green.

Length: 7.9 cm.	Width/aperture: 2.7-1.2 cm.
Maximum width: 3.3 cm.	Depth/aperture: 0.6 cm.
Thickness: 0.2 cm.	Length of flattened point: 3.0 cm.

C. No. 9 in Fig. 1 — Celt, plano-convex in section with traces of median ridge on convex surface. Surface rough, bit battered from use. Poll shows evidence of having been used as a hammer. Mottled green.

Length: 15 cm.	Width at poll: 1.0 cm.
Width at bit: 3 cm.	Maximum thickness: 1.1 cm.

D. No. 10 in Fig. 1 — Celt, rectangular in section. Bit is sharp, with evidence of considerable use. Smooth surfaces with some erosion. Mottled light green and copper.

Length: 11.4 cm.	Width at bit: 3.2 cm.
Width at poll: 0.7 cm.	Maximum thickness: 0.9 cm.

E. No. 11 in Fig. 1 — Problematical; gouge and/or pick? Point is dull. Opposite end convex and thinned to sharp edge.

Length: 13.5 cm.	Length/aperture: 6.3 cm.
Max. thickness at center 1.1 cm.	Width/aperture: 1.7-2.4 cm.
	Depth/aperture: 0.9-0.3 cm.
Width at point 0.3 cm.	Width/sharp edge: 2.5 cm.

F. No. 12 in Fig. 1 — Problematical: pestle? Open socket oval in section. Utility end is round and smooth from use.

Length: 7.5 cm.	Length/socket 4.5 cm.
Width: 1.5 cm.	Width/aperture 0.8 cm.
Thickness: 1.2 cm.	

FIGURE 5

FIGURE 6

AWLS OR PUNCHES OF COPPER AND IRON

A. No. 7 in Fig. 1 — Awl, iron, rougly circular becoming rectangular at base. Tip is broken. Probably was hafted 10.9 cm. from base.

Length:	17.1 cm.
Maximum diameter:	0.6 cm.

B. No. 5 in Fig. 1 — Awl, native copper. Smooth and polished from use. Similar in shape to bone awls.

Length:	10.3 cm.
Maximum width:	0.6 cm.
Maximum thickness:	0.2 cm.

C. No. 6 in Fig. 1 — Awl, iron, circular becoming rectangular 1.6 cm. from sharp point. Opposite end broken.

Length:	22.8 cm.
Maximum diameter:	0.4 cm.

D. No. 4 in Fig. 1 — Awl, native copper, circular to sharp point, square in section toward base. Base broken. Smooth, polished by use.

Length:	15.8 cm.
Maximum diameter:	0.9 cm.

FIGURE 7

BARBED OBJECTS OF COPPER AND IRON

A. No. 2 in Fig. 1 — Gaff-hook. Curved shaft, circular in section. Surface of shaft is rough with bright green patina. Barb and barb end of shaft for 4.5 cm. smooth.

Length:	13.0 cm.
Maximum diameter:	0.9 cm.
Outside length of barb:	3.5 cm.

B. No. 3 (Not shown in Fig. 1) — Fish spear, single barb. Straight shaft rectangular in section. Surfaces rough, eroded with slight fracture on shaft possibly the result of poor annealing.

Length:	11.3 cm.
Max. width/shaft	0.8 cm.
Width of barb:	1.0 - 0.3 cm.
Outside length of barb:	2.8 cm.

C. No. 1 in Fig. 1 — Fish spear, iron, double barb, circular shaft becoming rectangular 4.8 cm. from pointed base. Rough surface, corroded.

Length:	21.0 cm.
Outside length/barbs:	1.0 - 1.1 cm.
Width of barb:	0.5 cm.

FIGURE 6

FIGURE 7

FIGURE 8

DISCS, PROJECTILE POINTS OF COPPER AND IRON

A. No. 34 (not shown in Fig. 1) — Disc, trade copper. Ovoid perforation punched 0.8 cm. from edge. Transverse marks of tool on both surfaces.
   Diameter: 3.0 cm.
   Perforation: 0.5 cm. by 0.4 cm.

B. No. 35 (Not shown in Fig. 1) — Disc, trade copper, circular perforation punched 0.3 cm. from edge. Marks of small circular hammer on one surface.
   Diameter: 2.7 cm.
   Perforation: 0.5 cm.

C. No. 33 in Fig. 1 — Projectile point, native copper. Bevelled on both faces. Extremely sharp edges. Smooth.
   Length: 4.1 cm. Stem: 0.9 cm.
   Maximum width: 1.8 cm. Thickness: 0.1 cm.

D. No. 31 (Not shown in Fig. 1) — Projectile point, trade copper, stem missing. Edges sharp, cut by cold chisel. Hammer marks on both surfaces.
   Length: 3.5 cm.
   Maximum width: 1.9 cm.
   Thickness: 0.05 cm.

E. No. 30 (Not shown in Fig. 1) — Projectile point, iron, sharp edges. Slight corrosion.
   Length: 4.4 cm.
   Maximum width: 2.0 cm.
   Length of stem: 0.6 cm.

F. No. 32 (Not shown in Fig. 1) — Projectile point, native copper. Edges ground.
   Length: 4.4 cm.
   Maximum width: 1.9 cm.
   Length of stem: 1.2 cm.

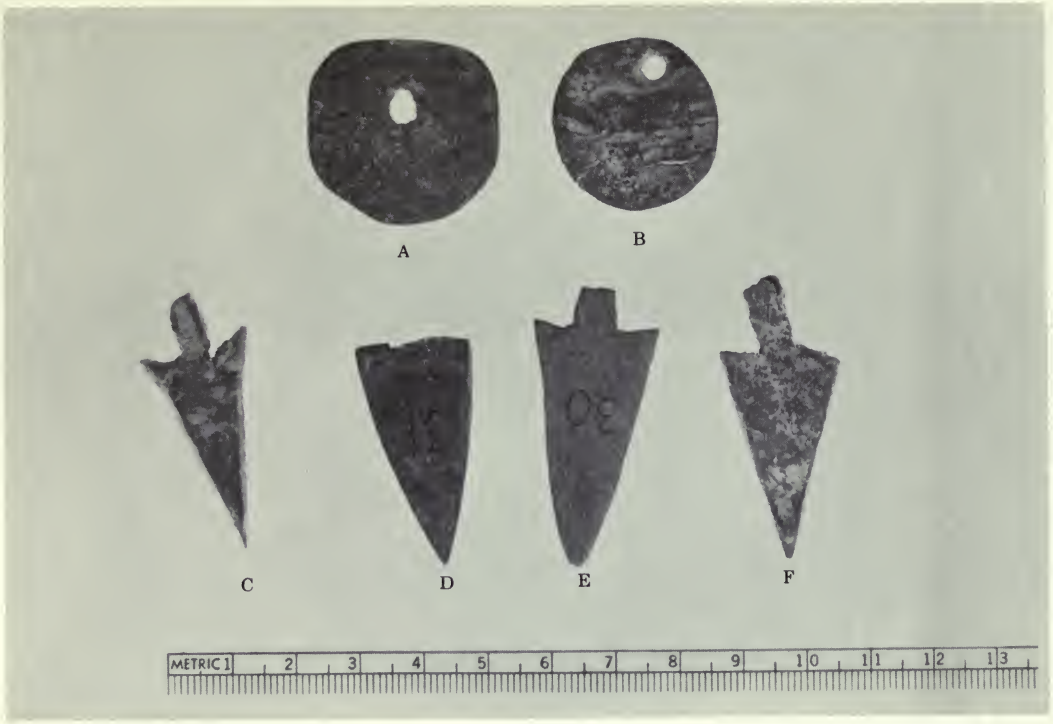

FIGURE 8

FIGURE 9

COPPER KETTLE

No. 37 in Fig. 1 — Copper kettle. Fractured at base. Bent on one side where lug is missing. Base was probably rounded. Rim rolled over circular iron band from inside of kettle. Fine horizontal lines circle outer surface to depth of 4.5 cm. to 5.0 cm. One lug has been repaired. Reparation is bent and broken, with rivets immediately beneath rim and above original rivets. Copper color, mottled green.

Diameter at rim: 14.8 cm.
Diameter of rim roll: 0.6 cm.
Probable diameter at base: 9.0 to 10.0 cm.
Probable depth: 5.0 cm.
Lug reparation: 2.2 cm. by 3.0 cm.

Rivets in reparation: 1.5 cm. apart, center to center
1.6 cm. below rim

Lug, estimated of original from coloration: 3.5 by 2.0 cm.

Rivets, original: 1.7 cm. beneath rim
0.5 cm. and 0.7 cm. diameter
1.5 cm. apart center to center

Perforation in lug: 0.8 cm.

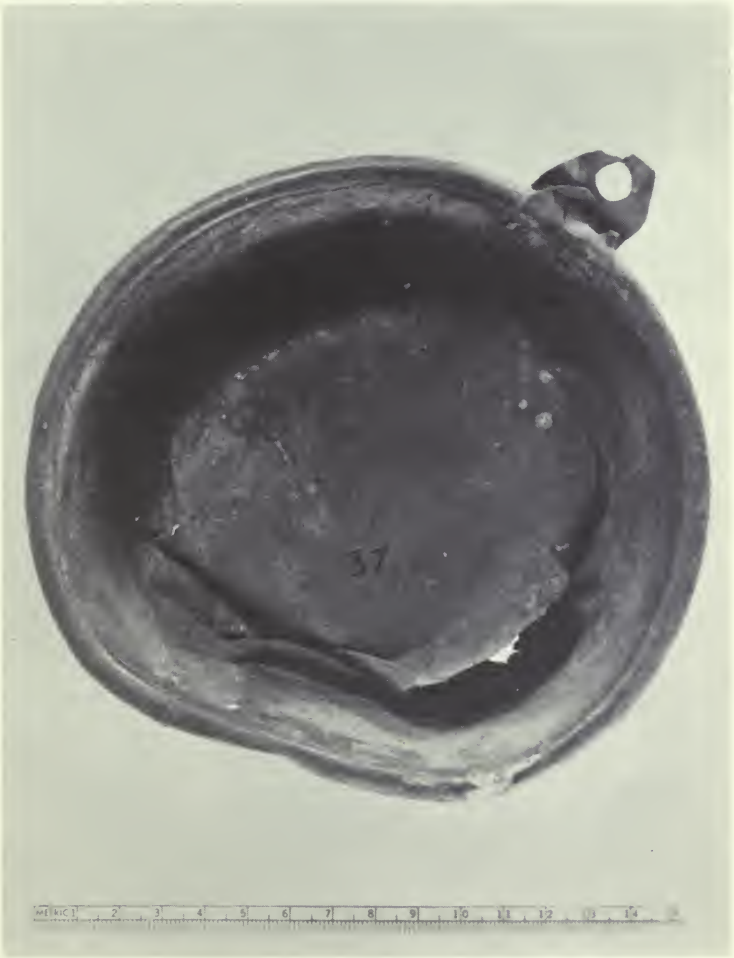

FIGURE 9

FIGURE 10

COPPER KETTLE (Basal View)

No. 38 in Fig. 1 — Sides battered and base fractured. Base is flat. A fold in copper about 2 cm. deep circles kettle immediately beneath rim. Rim is rolled from inside over iron band 0.7 cm. in diameter. Iron is broken. Both lugs missing, copper rivets in place. Lugs have been iron, corroded imprints measuring about 5.0 cm. by 3.5 cm. and 6.5 cm. by 3.0 cm. Rivets are approximately 3.0 cm. to 4.0 cm. below rim before folding and 3.3 cm. apart. Copper color. Mottled green.

Diameter at rim: 11.5 cm.
Diameter at base: 11.5 cm.
Probable depth: 9.0 cm.

FIGURE 10

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THE BOOKSHELF

BOOK REVIEW

The Kingston Oneota Site. Dean Straffin. Report No. 2, Office of the State Archaeologist of Iowa, Department of Publications, University of Iowa, Iowa City. 1971, 82 pp. $2.00 (Paper).

The publication of the Kingston site report adds yet another portion of data to the accumulating confusion which is known as the Oneota Tradition in mid-America. This report is noteworthy, however, since it records the first major excavation of an Oneota site in southeastern Iowa. The Kingston site lies on the Mississippi River 25 miles north of the DesMoines River confluence. This positions it on one proposed trade route between the sites of Cahokia and Aztalan (i.e., the Mississippi River) and between Cahokia and the Middle Missouri villagers of the Great Plains (i.e., up the DesMoines River and others in Iowa). Considering how little we now know about the relationships between Oneota and the Middle Mississippian developments centered at Cahokia, it is surprising that this is the first major research of Oneota in southeastern Iowa.

Straffin uses the first pages of this report to outline briefly the history and development of Oneota research and to describe the Kingston site and its excavation. We are told that the site is ceramically more similar to the Oneota assemblages of northwest Iowa (Correctionville) and the Clariton River region of Missouri (Guthrey, Utz, and Dowell sites) than to the Orr components of northeast Iowa. This statement is quantitatively analyzed for theClariton River material only. The majority of between-site comparisons discussed are of a qualitative nature, usually similar design elements (e.g., ". . . impressionistically, sherds representative of Gradwohl's Moingona phase are not very different from those at Kingston" (p. 34). As for the excavation, the cultural zone continued a "few inches beneath the plow zone" (although the feature profile maps show cache pits about 60 inches deep) and contained only six features (in 375 square feet of excavated area) and no structures. Three tightly-grouped carbon-14 assays center around AD 1325 ± 95 (I-4923).

The largest part of the Kingston report has been given over to the description of faunal remains, stone and bone artifacts, and ceramics. All this information is presented in a surprisingly brief and generalized form. This writer had not had the opportunity to read Straffin's original manuscript (Ph.D. thesis), but a footnote in the introduction (p. 1) indicates that it is published as this report "with revisions." Undoubtedly a significant portion of the detailed descriptions of this material was edited.

Bone identification for the faunal analysis was apparently done by Straffin under the guidance of Homes Semken, a vertebrate paleontologist in the Department of Geology at the University of Iowa. Identified bone has been itemized under the following headings according to genus and species: bone, teeth, minimum number of individuals, and individuals per feature. A table of meat weight estimates was calculated for the six types of animals most frequently identified in the site. The author discusses a number of inferences concerning the discontinuity of some types of bone; e.g., the high proportion of deer long bone extremities over axial skeleton elements, or the large number of beaver incisors and low numbers of cranial and postcranial remains. The power of this faunal analysis is somewhat diminished, however, by disparities in the collection studied (to date). The author states that, "Due to the paucity of study collection representative of certain genera a number of identifiable faunal remains have as yet to be identified" (p. 7). Bird bone was not identified due to the lack of modern comparative collections (at Iowa), and small mammals and rodents were not sampled since their bones tended to pass through the quarter-inch screens used in the excavation.

Description of the bone and stone artifacts follows a common pattern of the listing generalized attributes under each category (e.g., scapula hoes, antler drifts, end scrapers, etc.) with appropriate measurements (in tables) and scattered references to similar finds in other sites. As is the custom in publications of the Office of the Iowa State Archaeologist a multitude of good artifact photographs accompanies this monograph.

Ceramics are dealt with succinctly and adequately enough for the reader to gain an "impressionistic view" (Straffin's terms) of the Kingston assemblage. Again the photographs of a range of sherds are a great help. Interestingly, at no time does the author introduce into the discussion any formal ceramic types, either from Kingston or any other Oneota assemblage. Design motifs from other sites, particularly from Correctionville, Utz, Guthrey, Dowell and others, are compared to the Kingston collection. For the later three, all Missouri sites, these comparisons were tested using a chi square analysis, and of the three, the Utz ceramics showed the largest disparity with Kingston.

Straffin concludes his monograph with four inferences of varying certainty. The first, that, "The Kingston assemblage may reflect the cultural readjustment of corn farmers to a worsening environment, the result being an increasing reliance upon the wild food resources found on the broad, poorly drained Mississippi floodplain" (p. 34). The author is referring to the onset of the Neo-Boreal episode, a period of deteriorating climate for corn farmers (Baerreis and Bryson 1965). The evidence in the Kingston material for this inference is inconclusive, since paleobotanical remains

were not reported and the faunal analysis was not completed.

Another conclusion, that influence (as shown in the ceramics) from Cahokia was minimal and from Aztalan nonexistent at Kingston, provides Oneota researchers with yet another indication of Oneota's independence from Middle Mississippian developments. This is puzzling when we consider how close Kingston is to the then contemporary (Late Old Village/early Trappist phases) site of Cahokia.

Straffin's third conclusion is based on the absence of Alamakee Trailed ceramics and other Orr attributes at Kingston. He concludes that, ". . . Alamakee Trailed ceramics and other Orr attributes either are later in time, represent another cultural group, or both" (p. 35). The absence of significant influence from either the Orr components or Cahokia at Kingston seems to challenge our knowledge of culture dynamics; i.e. what were the interrelationships and forces operating within and between two or more contrasting contemporary groups within the same general region (in this case the Mississippi valley).

The author has wisely avoided placing the Kingston assemblage into the Oneota terminology (Willey and Phillips 1958), primarily because few Oneota sites have been excavated in Iowa and far too many chronological gaps remain. He has instead invoked Henning's (1970:162) concept of group continuity, thereby relating Correctionville-Blue Earth, Kingston, and "certain Chariton River components in Missouri" because of their similar traits and relatively early dates. Straffin does not discuss the intricacies of this proposed relationship, nor does he suggest how or why these components, which are geographically over 200 miles apart, can be related.

As a final comment the site map (fig. 1, p. 51) is rather small (100 ft = 1 cm) and shows very little information. A detailed excavation map is not included with this report.

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David W. Benn
University of Wisconsin-Madison

BOOK NOTICES

Archaeology: The Ways and Means to Prehistoric Man. W. J. Hranicky and M. D. Kerby. Privately published, Arlington, Virginia. 1972. 81 pp. At least 30 figs. $3.00 (Paper).

Written by concerned amateur archaeologists, who are active members of the Archaeological Society of Virginia, this introductory manual to field archaeology seems to be directed primarily toward other amateur archaeologists. It is comprehensive in the topics covered—everything from the objectives of archaeology to how to find, describe, and excavate sites to how to analyze the data found and publish a report of the results is discussed—but the treatment of individual topics is not exhaustive. Besides the core of the book, which deals with field work and how to go about it, brief chapters are also devoted to such topics as dating techniques, computers in archaeology, museums, archaeology and the law, a list of American amateur/professional archaeological societies, a glossary of selected terms, and even an archaeological self-test. Youngsters, in particular, may find this an interesting first book on field archaeology. For further information, or to order a copy, contact W. J. Hranicky, Box 4211, Arlington, Virginia, 22204.

Red Rock Country: The Geologic History of the Colorado Plateau. Donald L. Baars. Doubleday/Natural History Press, Garden City, 1972. 224 pp. 59 figs. $9.95 (Cloth).

Written by an experienced guide and field geologist, this book is intended to introduce the non-specialist to one of the world's most spectacular natural wonders, The Grand Canyon of the Colorado River, and its environs. The Colorado Plateau is a physiographic region that is characterized by horizontally lying but deeply dissected Paleozoic sediments centering on the famous Four Corners region where the states of Utah, Colorado, New Mexico, and Arizona abut in a single point. This region has been of interest to anthropologists since it was first explored by John Wesley Powell in 1869. It has been of special interest to archaeologists, for it was here that the Anasazi cultural tradition attained a spectacular peak, as embodied in such famous sites as the "cliff palaces" of Mesa Verde and Chaco Canyon, and then enigmatically declined about A.D. 1300. The book deals not at all with the aboriginal cultures of the area, however. Its topic is geologic history, and as such, it provides the anthropologist interested in Southwestern cultures with

an excellent geologic background for better understanding some of the environmental constraints encountered by the aboriginal inhabitants of the region. Geologically oriented tourists to the Grand Canyon area will probably find this book especially informative and perhaps constitute the primary audience toward which the book is directed.

NEWS AND COMMENTS

This second issue of *The Wisconsin Archeologist* under new editorship, late to press because I have just returned from a five-month research project in Yucatan, Mexico, sees the inauguration of a change in print size as contrasted with the March issue. I think most of you will agree that, for the relative smallness of the journal's pages, the print was needlessly large. Moreover, by using smaller print, we shall be able to get more words per page, which offers some economic advantages, since our printing costs are by the page rather than by the word. Accordingly, in this issue the print size has been reduced 20% over that of the March issue. Assuming that this does not turn us into a society of squinters (please let me hear your reactions), we shall continue this print size in future issues.

I should like to call your attention to what is no doubt the most important federal legislation dealing with archaeology ever to appear before Congress. In a nutshell, the proposed legislation requires any Federal agency with a program that will endanger or destroy scientific prehistoric, historic, or archaeologic data to expend up to 1% of that program's budget to protect or recover those data prior to their loss. This bill came before the 92nd Congress last year where it passed the Senate as S.1245, but died in the House (H.R.6257) due to lack of time. The same bill has now been reintroduced in the 93rd Congress in the Senate by Senator Frank E. Moss of Utah (S.514) and in the House by Representative Charles E. Bennett of Florida (H.R.296). Once again the bill has passed the Senate (where both Wisconsin Senators voted for the bill; indeed, Senator Nelson was an official co-sponsor of S.514) and is now undergoing hearings in a House sub-committee. Because House procedures permit no more than 24 co-sponsors on any one bill, five other parallel bills—H.R.3582, 3583, 3584, 3585 and 3586—are also before the House. Second Wisconsin District Representative Robert W. Kastenmeier is a co-sponsor of H.R.3584. You can each make a contribution to this most worthy cause by writing your Congressman NOW urging him to support this legislation and, in the cases of Senators Nelson and Proxmire and Congressman Kastenmeier, thanking them for their past support.

AUTHOR INFORMATION

The Wisconsin Archeologist publishes original articles dealing with the anthropology (ethnology, physical anthropology, archeology) of the state of Wisconsin and adjoining regions of the United States and Canada. Articles of general topical and/or theoretical interest will also be considered.

All manuscripts submitted for publication must be typed on good quality, non-corrasable, 8½ by 11 inch white bond paper. Typing is to be on one side only, double spaced throughout, with at least one inch margins on all sides. Abstracts of up to 150 words are required. To be most informative, abstracts should emphasize what was learned or concluded as well as what was done. *No footnotes are permitted.* References to literature sources are to be included in parentheses within the text in standard anthropological style with the author's surname, date of publication, and pagination or other information. See examples in this issue. In a References Cited section at the end of the manuscript only those sources actually cited in the text are to be included. These are to be arranged alphabetically by author. For examples of typical bibliographic entries under References Cited, examine the papers in this issue.

All illustrations, including maps, line drawings, and photographs, will be published as Figures to be numbered consecutively in a single series (Fig. 1, Fig. 2). Tabular materials will be published as Tables and numbered consecutively in a different series than the Figures (e.g. Table 1, etc.). Both figures and tables must be provided with titles or captions and must be cited by number in the text. All illustrations must be submitted as black and white line drawings or as glossy prints, preferably in 8 by 10 inch sizes but no smaller than 5 by 7 inches. Be sure that photographs are sharp, clear, and have good contrast and that all illustrations are provided with a scale and/or a directional indicator where appropriate.

Authors should submit an original copy and retain at least one copy for themselves. Twenty reprints of each article will be provided free to each author.

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September 1973 Volume 54, Number 3
New Series

THE WISCONSIN ARCHEOLOGIST

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Incorporated 1903

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Entered as Second Class Matter at the Post Office at Milwaukee, Wisconsin, 53201. Office of Publication, P.O. Box 1292, Milwaukee, Wisconsin, 53201.

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Published Quarterly by
The Wisconsin Archeological Society

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CHIEFTAINSHIP AMONG THE POTAWATOMI: AN EXPLORATION OF ETHNOHISTORIC METHODOLOGY

David A. Baerreis
University of Wisconsin-Madison

ABSTRACT

Recent ethnographic studies (Landes, Ritzenthaler, Skinner) provide limited and even contradictory accounts of the pattern of chieftainship among the Potawatomi in earlier times. A comparative study by Callender gives a more extensive reconstruction for about 1800 A.D. Ethnohistoric evidence is examined from a variety of approaches to test the Callender reconstruction and expand the ethnographic data. A dual pattern of village and war chiefs with responsibility centering in the local community similar to that described by C. C. Trowbridge for the Miami in the early nineteenth century is indicated as being present among the Potawatomi and the existence of tribal chiefs is denied. Suggestions are made regarding the factors that led to the disintegration of the institution of chieftainship.

INTRODUCTION

Although publications of recent years have added substantially to the ethnographic information concerning the Potawatom (Ritzenthaler 1953; Callender 1962; Landes 1970), accounts concerning some segments of their culture are still limited and, indeed, confusing. One such sector, despite the fact that it might appear to be of central importance, is the nature of the institution of chieftainship. The earliest comprehensive report on Potawatomi ethnology, that of Alanson Skinner, published as Volume 6 of the *Bulletin of the Public Museum of the City of Milwaukee* (Skinner 1924, 1926, 1927) describes frankly the diversity of opinion among the Potawatomi themselves. One could not wish for a better illustration of the consequences of centuries of contact with Europeans in profoundly modifying native institutions than the confused picture he presents. Quite in contrast, Callender (1962) using techniques similar to the linguistic approach by which an early form of a language is recreated through a comparison of several modern dialects, gives a concise reconstruction of Potawatomi social organization, including chieftainship, as of the year 1800. Yet despite the seeming greater precision of this latter reconstruction, one is left with no clear conception of the degree of reliability to be assigned to this reconstruction. More seriously, one lacks an adequate appreciation of the dynamics of the changing situation that led to such a transformation in Potawatomi social organization over time.

None of the modern ethnologists have made adequate use of historical documents to add an appropriate time dimension to their investigation. This approach, now known as ethnohistory, is still sufficiently in its infancy that a presentation of a reconstruction of Potawatomi chieftainship as a methodological example would perhaps serve a useful purpose. The opportunity to check the results against an alternative methodological approach, exemplified by Callender's study, provides a further incentive.[1]

PREVIOUS INVESTIGATIONS

Although Alanson Skinner first visited the Potawatomi in 1912, he indicates that the bulk of his information was obtained in 1923 from informants residing in Oklahoma and Kansas though to this were added data secured from Wisconsin informants. His principal Oklahoma informant is identified as Samuel Derosier, "a member of the Bald Eagle gens and of the Wabash Band" (Skinner 1924:12) so that although the ethnography is labeled as "Prairie Potawatomi" it should perhaps be seen as a composite picture of the Potawatomi as a whole. Since Skinner's description provides a convenient point of departure for our analysis, it is worth quoting in detail.

> "Native testimony does not agree as to whether the tribal chieftainship in olden times was an office hereditary in the Fish clan or in the Bear clan, but the preponderance of evidence strongly favors the former. The Sauk and Kickapoo likewise state that with them the office of tribal chief was hereditary in the Fish clan. In later years the Potawatomi declare that their chiefs were largely appointed by Government officials from among the most pliable men of the tribe and not at all according to Indian custom. They maintain that they have never recognized several of these "straw" chieftains.
>
> "The chief was a civil and military officer, and annually appointed a ceremonial chief to conduct the ceremonies of the tribe, changing the appointee from year to year. This ceremonial chief took the lead in all clan and bundle ceremonies. In sugar making, preparing the gardens, moving from summer to winter quarters (and the reverse), mat making, and many other activities, the permission of the ceremonial chief had first to be obtained before the rest of the tribe or village could proceed in any of these matters. Any one who neglected to feast the ceremonial chief and get his permission was said to have "stolen" the privilege he thus usurped, and was accordingly censured by the public.

"The tribal chief was supposed to entertain all visitors from other tribes. When the arrival of strangers was announced the chief ordered his braves and waiters to care for them, billeting two to a lodge among his people at large. A day was set aside when the chief visited the strangers, and offered them a pipe to smoke, and gave them presents. His braves rose early each day that the guests remained in the village and picked out certain women to make feasts for them.

"Each chief had from four to eight braves as attendants.

"Some informants state that there were no permanent chiefs until the government interfered, and that the tribal chief, like the ceremonial chief, was annually chosen from a different gens" (Skinner 1924:19-20).

It is evident that the Potawatomi of the twentieth century, or at least Skinner's informants, no longer had an adequate conception of the nature of the chieftainship and the manner in which it had functioned in the political organization of the group. Alanson Skinner's presumed objective of reconstructing the aboriginal culture as remembered by the Indians of his day was defeated by the transformations in Potawatomi culture that accompanied the fundamental changes in the nature of their economy and in their relations with European and American powers during their several hundred years of contact. Yet this extended excerpt from his report should not leave the impression that data concerning distinctive Potawatomi practices were virtually negligible. His report is a rich resource and in particular we may note that he provides us with an impressive account of clan ceremonies and specifically with lists of some 229 personal names associated with clans or phratries. These latter are most useful in identifying the affiliation of individuals mentioned by name in historic documents.

We shall deal with the study of Ruth Landes next for although it is the most recent of the publications (1970), the information was largely secured in 1935-36 from the reservation population in Kansas, thus drawing upon much the same pool of information as did Skinner. The subtitle of her book, "Tradition and Ritual in the Twentieth Century," indicates the central core of the data she succeeded in eliciting but her introductory statement does incorporate a paragraph summarizing her information in chieftainship. Again we shall quote the entire section to avoid any charge of misrepresentation of the character of the descriptive accounts.

"Villages came under the jurisdiction of a chief, who functioned like a peace officer. Elderly informants said that, until late in the nineteenth century, the institutions of chief and

of traditional police flourished, keeping criminal and bundle violations (which often caused murder and rape) within bounds, as is described subsequently. Informants said that then there were three divisional chiefs: one for the Potawatomi on the Illinois prairies, one for those in northwest Indiana, and one for those in southwest Michigan, the latter being the paramount chief. Each inherited his office for life from father or elder brother, who had trained him, by tacit general understanding. The chief's strength lay in the respect for his judgment. A chief's district contained many villages. To handle an emergency in a distant village, the chief named temporarily a local "honored assistant," skebewis (cka'be·wis), to act for him. Informants said that the three chiefs, with representatives elected from each village, met to negotiate important civil or international affairs, such as agreements with the United States government. The principal chief voiced the decision that carried the day, acceptance supposedly being predetermined by his cool temperament. However, councilors and others could dissent and even rebel with impunity, for the three chiefs functioned in the name of peace, not war" (Landes 1970:13).

Robert Ritzenthaler who investigated the Wisconsin Potawatomi in 1951, indicates that chieftainship was traditionally inherited, passing from father to son. He suggests that civil chiefs never constituted a powerful force in the "atomistic" nature of earlier Potawatomi life and that some time within the past fifty years the hereditary line of chiefs was broken and that a number of self-appointed chiefs have arisen (Ritzenthaler 1953:123).

While these three ethnographic accounts do not exhaust the list of studies arising from field investigation, they are the most substantial and fairly reflect the character of information provided by the direct testimony of the recent Potawatomi. We may therefore appropriately turn to the study of Charles Callender (1962) which includes a reconstruction of Central Algonkian social organization as it existed in 1800. Callender suggests there are three subtypes in the Central Algonkian social organization of this period, one of which he calls the "Prairie subtype" shared by the Sauk, Fox, Kickapoo and Potawatomi which is differentiated on the basis of extensive clan ritual, inheritance of clan names, and by a non-hereditary dual division.

In regard to the nature of the community, Callender indicates that each tribe was subdivided into units loosely designated band or village. "Band" might refer to the people of a geographic region or in later times to the followers any leader collected, no matter how few these were or how briefly

they were in association. Any Indian settlement was called a village or band and village might be used interchangeably for a recognized community with a definite political organization.

> "Such a village-band was a group of several hundred persons forming a community in the summer village (ōtāweni) and for the spring buffalo hunt, but at other seasons breaking up along family lines into smaller units. During the summer phase, the band might gather into a single village, or divide among a large town and smaller satellite villages. Settlement patterns depended partly on the nature of the times; if warfare threatened, band members concentrated in one place for greater safety. . . . The Fox and Kickapoo had at least two major bands; the Potawatomi, an indeterminate number" (Callender 1962:12).

He indicates that band membership was unstable and while a permanent core persisted, disaffected persons drifted away to join other groups or to form a new band. An ordinary community by 1800 would have drawn its members from several bands and included persons from other tribes as well.

The village-band organization is described as similar in all the tribes of the Prairie subtype. "A loosely organized council debated policies and determined which hunting grounds would be used in winter. Occasionally it tried to settle community disputes, in company with the village chief (okimāwa)—often called peace or civil chief—who was in nominal control of peacetime activity but had little real power" (*Ibid:* 13). The village chief called council meetings, presided at gatherings and received delegations from other groups. Callender states his property was available to any person in need and that he was selected by the council from the particular lineage within which the office was inherited. The war-chief, on the other hand, gained office through military ability and held it be leading successful war parties. He had charge of the camp police and they carried out sentences of punishment, including destruction of property of offenders, ordered by the council. Both village chief and war chief were assisted by a "crier" who made announcements and served as a messenger.

As a final point, we may cite Callender's comments in regard to the broader organization: "Bands were held together by a tribal council, including representatives of each community, meeting at the settlement of the particular village chief recognized as chief of the tribe. Tribal unity was weak, and bands tended to be autonomous. If beyond the range of easy communication, or if serious disagreement developed along the lines of band division, they often became entirely independent" (*Ibid:* 18).

In the sections above the comments of the ethnographers (Skinner, Landes, Ritzenthaler) using statements of Potawatomi informants and the reconstructions of a comparative

approach (Callender), pertaining to Potawatomi chieftainship and its social context have been abstracted and summarized. No attempt has been made to evaluate the validity of the constructs presented since it has been felt that this must await the presentation of further evidence derived from ethnohistoric sources.

THE ETHNOHISTORIC APPROACH

As was suggested earlier, it is clear that the Potawatomi of the twentieth century no longer had an adequate conception of the nature of chieftainship and the manner in which it functioned in the political organization of the group. But while this information is lost, so far as modern informants are concerned, it is not impossible to retrieve it. The 250 years of contact between Potawatomi and European have resulted in the production of many documents in which the tribe is mentioned. Particularly when negotiations were carried on with the group, documents frequently mention the names of individuals who figured as leaders of the Potawatomi and a substantial body of information concerning some of them can be accumulated. In searching through such documents for information on the nature of the political organization, one major precaution must be exercised which, at the same time, is also a primary motivation for making such an investigation. While Alanson Skinner may have conceived of his objective as the reconstruction of the aboriginal culture as remembered by his modern informants, Potawatomi culture has obviously been transformed or seriously modified by the many years of contact and also responded to the fundamental changes in the nature of their economy during this same period. Aboriginal culture, in the sense of pre-contact conditions, may be impossible to retrieve but it is possible to at least partially reconstruct the manner in which political institutions adjusted to changing conditions on the frontier. Such a reconstruction is of fundamental value as a case study to establish the patterned response of institutions to ecological and contact factors. Studies of this character are essential to our understanding of the regularities which may be seen in culture change.

Evidence for the existence of Village and War Chiefs among the Potawatomi, with distinctive functions for each, is readily obtained from the direct testimony of the Indians themselves. The Bulger Correspondence, preserved in the Dominion Archives at Ottawa, Canada, covers the years 1810-1816 and contains reports concerning those Indians who were treating with and aiding the British during the troubled years of the War of 1812. In copies of these papers printed in the Collections of the Michigan Pioneer and Historical Society, under the date of January 15, 1815 at Michilmackinac were recorded the "minutes of a council held this day at the request of Chebainse a Potewatemy Chief of the St.

Josephs and a Band of Ottawas of the same place Saguina and Grand Traverse Indians" (Bulger 1893:469-71). In Chebainse's speeches we find a clear demarcation between the two kinds of chiefs. In addressing the council, he first states "Father I address you, in the name of our principal war chiefs and warriors of our Nation. . ." and follows this by "Father I now again address you in the name of all the Village chiefs of our Nation residing at and near St. Josephs" (*Ibid:* 470). Subsequently in his address he indicates some of the differing responsibilities of the two kinds of chiefs.

> "Father The war Chiefs & warriors whose duty is to manage all matters relating to war have addressed you, and we the Village chiefs humbly beg you will pay attention to the wants of your children who supplicate your aid and assistance.
>
> "Father We the Village Chiefs will vouch for the sincerity of what the war Chiefs & warriors have advanced, your Children are eager to engage the Enemy who are the cause of all our distress & misery but they require the means, we the village Chiefs can only afford advice, men and our own presence, which isn't sufficient. Arms & ammunition is required to defend our Lands, women & children" (*Ibid:* 471).

Further documentation of the nature of this institution is provided in the narrative of William H. Keating who accompanied the Stephen H. Long expedition of 1823. While the party was at Fort Wayne, the services of Metea were obtained as an informant to provide information regarding Potawatomi customs. The appropriate section from Keating's report is as follows:

> "The chiefdom is hereditary among the Potawatomis. If a chief should be destitute of male heirs, sons or nephews, he assembles the warriors of his tribe, and appoints one of them his successor. Should he die without leaving any male heir, and without having adopted any, then the warriors convene and appoint one of their number to succeed to the vacant dignity; 'for a nation cannot exist' says Metea 'without a leader.' In their councils no regular debate takes place. The first man nominated as chief generally unites all votes; it is evident that much must depend upon the influence of him who nominated a candidate. It is, however, usual to ascertain the wish of the people beforehand, and for this reason they are always consulted.
>
> "In like manner, if a man be desirous of leading a war-party, he mentions it to others,

secures their assistance, and then publicly announces his intention in the village, when such as please follow him. Previous to his departure, he performs his religious ceremonies and prepares what is termed his 'medicine' or spell, by which he hopes to insure success. If the chief of the village be opposed to the scheme, he undertakes to prevent it, by influencing their superstitious fears. To this effect, he counteracts, as they suppose, the spells prepared by the warrior, by walking round him in a circle, and then resuming his place. This they so firmly believe to vitiate the medicine, that it immediately puts a stop to the expedition. The power of the chief appears to rest exclusively upon his personal influence. He can use no coercive measures to obtain what he wishes, or prevent what he dislikes. Although the Indians have notions of right and wrong, they have no means of rewarding the former and redressing the latter; the chief cannot punish a man for any offence whatsoever. If the crime committed be flagrant, the party that deems itself injured may seek for redress in a forcible mannner, but there is no mode of obtaining it by fair and legal means. In some cases, however, a breach of faith may be punished; if, for instance, a chief wishes to undertake a military operation, he convenes his warriors and states his views; should they agree to it, they declare their assent by presenting him with a string of wampum, which is kept as an evidence of their acquiescence. Should any one of those who have agreed to go, afterwards break his promise, he is liable to be punished by forfeiture of part of his property, or by expulsion from the village. A string of wampum is sometimes sent from one village to another, with a piece of tobacco attached to it as a proof of the faith of the messenger. . . . The power of the chief is only exercised so long as he behaves himself in a manner agreeable to the wishes of his warriors, for though the dignity be a hereditary one, it is not uncommon for them to depose their chiefs. The principal prerogative of the chief is to conduct all military operations; when once war is declared, he cannot conclude peace without the consent of his warriors. The duty of dividing the annuity paid to them by the United States' Government, likewise devolves upon the chief. Formerly the partition was made by him in the manner that he thought best, but some cases of malversation have led to a different method. The money is paid to the principal chief of the nation, who calls his people round him, places them in a circle, and then throws a dollar to each, all

round, continuing this operation until the whole of the money be disposed of. In this division the father of a family receives an equal share for every individual in his household, whether male or female, child or adult . . ." (Keating 1824:122-124).

While illuminating in detail, it is clear that Keating in assembling the information provided on chieftainship was unaware of the distinctions between the two types or perhaps they were not made clear to him by his interpreter. Yet in this account there is mention that "if the chief of the village" is opposed to the war party, he can prevent it. At the same time it is stated that "the principal prerogative of the chief is to conduct all military operations." Clearly these contradictory statements pertain to the village chief and war chief respectively and one can readily sort the functions assigned to the two types. It is also possible that in the period subsequent to the War of 1812 the distinction between the War and Village Chief is becoming blurred. During this period it was the policy of the noted Shawnee, Tecumseh, to promote the principle that all lands should be regarded as common property by the Indian tribes as a whole with none to be sold unless agreed upon by all. Since the War Chiefs were prominent among those who supported him, he appears to have encouraged a deliberate policy of assassination of those Village Chiefs who opposed him and agreed to the sales of land. This is reflected in Tecumseh's speech to Governor Harrison on August 20, 1810, which at the same time provides further documentation of the distinction between the two categories of chiefs.

"Brother. You ought to know what you are doing with the Indians. Perhaps it is by direction of the President to make those distinctions [i.e., of different tribes]. It is a very bad thing and we do not like it. Since my residence at Tippecanoe we have endeavoured to level all distinctions to destroy village chiefs by whom all mischief is done; it is they who sell our land to the Americans our object is to let all our affairs be transacted by Warriors.

"Brother. This land that was sold and the goods that was given for it was only done by a few. The treaty was afterwards brought here and the Weas were induced to give their consent because of their small numbers. The treaty at Fort Wayne was made through the threats of Winamac [a Potawatomi chief] but in future we are prepared to punish those chiefs who may come forward to propose to sell their land. If you continue to purchase of them it will produce war among the different tribes and at last I do not know what will be the consequence to the white people.

"Brother. I was glad to hear your speech you said if we could show that the land was sold by persons that had no right to sell you would restore it, that that did sell did not own it it was me. These tribes set up a claim but the tribes with me will not agree to their claim, if the land is not restored to us you will soon see when we return to our homes how it will be settled. We shall have a great council at which all the tribes shall be present when we will show to those who sold that they had no right to sell the claim they set up and we will know what will be done with those Chiefs that did sell the land to you. I am not alone in this determination it is the determination of all the warriors and red people that listen to me.

"I now wish you to listen to me. If you do not it will appear as if you wished me to kill all the chiefs that sold you this land. I tell you so because I am authorized by all the tribes to do so. I am at the head of them all. I am a Warrior and all the Warriors will meet together in two or three moons from this. Then I will call for those chiefs that sold you the land and shall know what to do with them. If you do not restore the land you will have a hand in killing them . . ." (Harrison 1922: 465-66).

While it is not germane to our specific thesis, it is interesting to note the difference in the use of kinship terms as a mode of address employed by Tecumseh as opposed to that of Chebainse in the earlier quotation. Tecumseh addresses Governor Harrison as "Brother" for he clearly sees himself as dealing with an equal. Chebainse, on the other hand, very respectfully addresses the British authorities as "Father." But more to the point, Tecumseh's speech not only provides documentation for the existence of the two types of chief but also evidence in regard to one of the internal pressures that could have changed or destroyed the institution of chieftainship itself. Such pressures upon the chieftainship were multiple and not exclusively internal in development. The destruction of the authority and position of the proper chiefs at this time is also attributed by contemporary observers to the influence of traders. William Clark writing to William Eustis, Secretary of War, on March 22, 1812 states: "It is not uncommon for Traders to use any sort of means in their power to induce the Indians to trade with them, form parties amongst the Tribes, and distroy the influence of the best Chiefs who do not second their views, by every means within their power" (Clark Ms.).

PRINCIPAL AND MEDAL CHIEFS

The historic records contain frequent references to "XXX, the principal chief of the Potawatomi" in a context which might lead to the inference that the person is the head chief or leader of the entire nation. Or we find occasional use of the term "head chief" as in the letter of Thomas Forsyth, Indian sub-agent at Peoria, directed to the Secretary of War on April 13, 1815, when he writes that "Gomo, alias Nasima the head chief of the Pottawattomies in the Illinois river is dead" (Forsyth 1888:336). Critical examination of the source material indicates clearly that this is not the case. The use of "principal" as an adjective simply conforms to its ordinary meaning of more important.

In the same letter of Thomas Forsyth to the Secretary of War, cited above, mention is made of "Black Partridge and Petchacho, the two principal chiefs residing near the Illinois river. . ." (*Ibid:* 337). Petchacho, Forsyth indicates, is the person who succeeded Gomo as chief so that he clearly did not succeed him as "head chief" of the Illinois Potawatomi. Supporting evidence is also given in a letter from William H. Harrison to the Secretary of War dated June 26, 1810, in which he discusses those who are supporting the Prophet and Tecumseh and are joining their confederacy.

> "I cannot hear that any principal chiefs of the Potawatomies (sachems or village chiefs) have given any countenance to the Prophet—his supporters are generally confined (amongst all the Tribes) to the war chiefs, or those who are heads of small bands" (Harrison 1922:433).

Not only would this comment support the interpretation of principal chiefs being the leading chiefs or more important chiefs of an area, but it also indicates that these tend to be the village chiefs, the ones whom Tecumseh bitterly opposed.

The need for the designation of some individuals as principal chiefs is implied in a comment by Gomo, the Potawatomi chief whose death was reported by Thomas Forsyth in 1815, in the course of a council held at Peoria on August 16, 1811:

> "Formerly we all lived in one large village. in that village there was only one chief, and all things went on well; but since our intercourse with the whites, there are almost as many chiefs as we have young men" (Edwards 1870:47).

Large villages do appear to be characteristic of the seventeenth century Potawatomi (cf. Deale 1958:312) so this comment may have historical accuracy, but perhaps Gomo also had reference to those chiefs known as "medal chiefs," persons who were designated a chief by an Indian Agent, General or Territorial Governor and given a medal to indicate their status. That this was indeed the case is indicated by a letter from Richard Graham, Indian agent in the Illinois region,

to J. C. Calhoun, Secretary of War, dated August 25, 1819:

> "It would be impracticable to deliver the annuities to their respective villages; no division could be made that would be an equal or just one from their numerous & dispersed settlements— every cheif has his own village & followers & and facility with which medals were acquired, have increased the number of cheiftains considerably - independant of these, there are numerous bands dispersed in very small bodies, under warriors who would not submit to the contract [reading uncertain] of his chief; are self styled chiefs & claim all the privileges and weight in council of the principal cheiftains- It was in part to correct this evil that a few of the principal cheifs wished to visit the President (as communicated by me in april last)" (Graham Ms.)

Are these not some of the "straw" chieftains Alanson Skinner's informants maintained they never recognized?

VILLAGE, BAND AND TRIBE

Thus the Potawatomi essentially had an autonomous village organization with chieftainship divided between the two types, Village Chiefs and War Chiefs. Perhaps because they lacked an early chronicler to give ethnographic detail, we find no mention in contemporary records of the office of Waiter. Alanson Skinner's description in his ethnographic account which was quoted extensively earlier, provides support for its probable presence. The importance of the role of Waiter in neighboring tribes in the early nineteenth century is supported by the extensive description of the Miami prepared by Charles C. Trowbridge based upon his observations and interviews in 1825 (Trowbridge 1938:15-16). Since the Miami also maintain a strong village organization with both village and war chiefs they serve as an appropriate analog for the Potawatomi. An earlier and equally detailed account of this institution among the Chippewa may be found in the 1778 journal of Henry Hamilton (Barnhart 1951:110).

Having indicated a desire to test the conclusions of Callender who reconstructed Potawatomi institutional organization through a comparative approach, it may seem somewhat circular in reasoning to supplement a presentation of specifically ethnohistorical evidence pertaining to the Potawatomi by comparative data. There is, however, a difference between reconstructing an ancestral form on the basis of a comparison of presumed descendants of that ancestral form and developing comparative evidence based on earlier descriptions pertaining to the time period for which the reconstruction is being made. Are similarities mainly a consequence of limited divergence from an ancestral form or mainly a consequence of acculturation through contacts with other groups? The response may well be that it depends on the sector of the culture involved,

yet clearly institutional form is malleable and subject to change through culture contacts. The operating assumption here is that the contemporary context is of overwhelming importance.

It would not appear necessary to extensively document the fact that the Potawatomi did not comprise a unified tribe which acted in concert. Previously cited material relative to the autonomy of chiefs adequately supports, in itself, the position that each local group acted independently. Even those groups resident within a restricted geographic locale—as on a particular drainage system —which we would ordinarily speak of as a band, lack unifying control. Such a situation is indicated by Louis Chevallier, a resident among the Potawatomi for thirty years, when he wrote on February 28, 1779 to General Haldimand concerning the Potawatomi of the St. Joseph's area who were inclined toward the British cause:

> "It does not seem to me, however, impossible to keep this nation in dependance, if they were united under the same chief, but divided as it is into six villages distant fifteen or twenty miles from each other it is very difficult to impose this yoke. Each village has its own chief who disposes his young men according to his private ideas . . ." (Haldimand 1891:375).

What is evident among the Potawatomi is a weakening, indeed a disintegration of the authority of the chief. The Indian Agent, Richard Graham, in his letter of August 25, 1819 to the Secretary of War which was earlier quoted, mentions the proliferation of self-styled chiefs and the large number of small, dispersed bands who have isolated themselves from the regular chiefs. Alexander Wolcott, Jr., Indian Agent at Chicago also writes of the small communities and lack of confidence in the chiefs.

> "Were the Indians of this Agency like those of some of the others living in large communities, under the guidance of Chiefs in whom they had confidence, and possessing a sufficiency of the means of subsistence, the annuities could be distributed, and their casual wants supplied, at an expense comparatively small. But living as they do, jealous, divided, destitute, the expense of delivering the annuities must amount to a sum considerably greater than the annuities themselves . . ." (Wolcott Ms.).

Governor Lewis Cass also reported a similar lack of confidence in the chiefs in a letter to the Secretary of War in 1822, indicating why it would be impossible to make annuity payments solely to the chiefs.

> "The objections to this plan are, that the great body of the Indians will follow the chiefs. They are so suspicious, that they will not trust them among us unless well watched. Having neither legal nor moral ties to bind them, they have no

confidence in one another and each feels that as he would spend the money himself, he has good reason to suppose the others would do the same" (Cass Ms.).

We have earlier mentioned that Tecumseh had worked to undermine the authority of the Village Chiefs. Perhaps this may have been a central factor in bringing about a changing pattern, but also of basic importance is the thorough change in economic practices. The Potawatomi when first seen by Europeans were sedentary, village agriculturalists with major winter hunts. Village life and intensive agriculture reinforced each other, essentially with agriculture making possible the common residence of the larger group. A thorough commitment to hunting and trapping together with the loss of interest in agriculture, broke apart the very fabric of village life for the Potawatomi. A pattern of dispersed settlements of small, mobile groups became the characteristic mode of life.

FOLKLORISTIC APPROACHES

Another line of approach that throws some light upon the institution of chieftainship is through the analysis of the folktales and myths of the group involved. One may see such tales as repositories of ethnographic fact, since they do tell how people act or acted under given circumstances. But perhaps more importantly they do indicate how people should act and thus are an expression of the value system of the people.

One example of a tale which indicates the insights to be gained in regard to such an institution as chieftainship is included by Alanson Skinner (1927:385-391) under the category of traditional tales. He comments that this particular tale ". . . seems to be a garbled version of the Blackhawk war from a Potawatomi standpoint, suffixed to an ancient Algonkian tale of a man who visited the Thunderbird's nest" (*Ibid:* 391). The story tells of a brave, powerful man, Mataukapiu (a member of the Bear clan, his name meaning "Sits-on-the-dirt-without-resting-on-anything") who killed some giant birds who had been endangering the people and then was angered because the chief (Wa pima, the Whitefish) would not make a sacred bundle of the bird's feathers but rather distributed them among members of the tribe. A conflict arose in which the tribe split into two bands, one following this brave warrior and the others remaining with the chief. The tale, in very illuminating fashion, says of the leader of the dissident faction:

> "In time, this man became a great warrior, but never a chief. He fostered great Medicine and Wabano dances, but he never talked kindly. His mouth was always for murder and war, which is not the kind of conduct in which a chief should indulge. A chief, when he rises to speak, should always be mild, and advise his people the best way. Okimau is a word which means this, in reality, and okimauwun has reference to the softness of a woman's heart. A chief must have feelings for everyone,

even his enemies" (*Ibid:* 389).

That the dissident warrior did not indeed become a chief or Okimau is revealed by the further development of the narrative which tells of the warrior and chief meeting many years later.

> "After much talk and questioning about each other's bands, the warrior said: 'My relation, I am glad to see you. You are getting old, and now I am going to ask a favor of you. You ought to think of me. I ask you to appoint me to be chief over my followers. Of course they really are your people, but make me a sub-chief under you'" (*Ibid:* 389).

But the chief would not do so for he said the warrior would never take advice. He said, "These people sitting here now are your followers. You are now their chief. What more can I do? What more do you want?" He did, however, appoint the warrior to be his representative at a conference to be held with the Menominee who were proposing a war to wipe out the Sauk. The warrior, upon going to the conference, however, said he had full power, did not report to Whitefish, and simply joined the other tribes to wipe out the Sauk (and all the whites). They were, of course, defeated and the tale ends upon a good moralistic note showing the desirability of following the advice of a real chief.

It is of interest to compare this characterization of a chief with that recorded for the Miami whom we have previously cited as presenting a similar pattern of chieftainship to the Potawatomi. Trowbridge's characterization of a chief, which seems to apply specifically to the village chief, is as follows:

> "The situation of a chief is considered very responsible. He ought to possess a perfect equanimity of disposition and to prevent any one from discovering signs of ill humour, much less rage or anger, in his conduct. He is oftentimes obliged to submit to insults and losses of property which an ordinary member of the tribe would resent. His utensil for cooking, his horses and hunting apparatus, are at the mercy of the villagers. On the other hand, if the nation or tribe to which he belongs esteems him as a wise and a good man, they do not fail in the spring of the year to make him presents of peltry or game and thus to compensate him for some of his losses" (*op.cit:* 14).

The parallel between the expected pattern of behavior in the two instances is remarkably close and we may use it here to reinforce the position taken that interacting tribes will tend to level the institutional differences that may have existed. A further point that should be noted is the concept that the chief must name his successor.

Alanson Skinner also records another folktale of the Potawatomi to which he gives the title, "Why the Potawatomi Have No Woman Chiefs" (1927:395-397). The story is of a Potawatomi woman, the daughter of a chief, who married another

chief's son, raised several children and was a model of respectability among her people. However she fell in love with another man and in order to elope with him pretended to fall sick and die. After her pretended death she was placed on a scaffold just prior to the time the village was to leave on a communal hunt. Her lover rescued her and they eloped to live among the Sauk, the woman pretending to be a man and the man a woman. Much later when they thought it safe they visited the original village but their disguise was penetrated by the woman's children and eventually both were killed. The story concludes on a moralistic note:

> "Everyone was amazed, and said again and again, "What is there that a woman won't do? The Sauk had departed and knew nothing of it. The Potawatomi brought home the corpse of the woman and buried it in the very tree where she had been buried before, and the man they interred under the roots. This was an example to all women, they said, for who can tell what a woman will do? Therefore, from that time on, it was decided that no woman could hold the office of tribal chief, even if she was in the hereditary line. This woman broke all the rules. She even went so far as to eat with men when she was undergoing her periods, and went right among the bundles. In this manner she had injured the whole tribe, and had ruined many young people" (*Ibid:* 397).

We are then informed that "All this story is written in picture writing on a deerskin in a bundle that Kisus owns in Kansas. This woman once owned this very bundle herself. It is a sacred bundle of the Fish clan, one of several that the clan owns" (*Ibid.*).

One implication of the story is, of course, that at one time women could be chiefs. Here again we may see if the pattern of political organization of the Miami might reflect a pattern similar to the contemporary Potawatomi organization. In regard to female chiefs, C. C. Trowbridge states:

> There are also female chiefs, both of war and of the village. They derive their powers by descent from the father who is a chief. The eldest daughter of each village and war chief is also a chief, or as the french say chefress. The duties of these female chiefs are confined to a superintendence of the preparation of nation feasts, or that part of them which is usually committed to women, to a kind of curious examination or rather watching of the affairs of the village and the conduct of the villagers, information of which they sometimes convey to the male chiefs, and to the collecting and preparing of smoked skins, moccasins, awls, sinews and other articles necessary to a war party for its convenience on the march, which they present to the leader for the benefit of the whole, before the

departure of the warriors. And their power is very limited, being consequent only upon their superior powers of persuasion and the general influence which as females they have over the men of the tribe (*op. cit:* 14-15).

It would seem the daughters of a chief could occupy a high status position even though presumably not "chief of the tribe".

GENEALOGICAL AND BIOGRAPHICAL APPROACHES

Another approach to the analysis of the pattern of chieftainship we may designate the genealogical or biographical approach. Were an ethnologist dealing with a functioning culture, the basic patterns involved in the transmission of the office of chief would be detectable in the genealogical records he could construct for the group. Although limited to the memory span of the ethnologist's informants, it would obviously be possible to establish a number of instances where one could state whether a chief had been succeeded in his office by his son, brother, nephew, etc. To a limited extent this can also be secured through historical documentation.

Occasionally various historical documents when reporting on the death of a chief, indicated the nature of the relationship of the individual who succeeded the deceased to that office. One reference of this kind is in a letter of Thomas Forsyth to the Secretary of War, dated April 13, 1815:

> "I am truly sorry to acquaint you that Gomo, alias Nasima the head chief of the Pottawattomies in the Illinois river is dead. He was true friend to our country, and was well acquainted with the population and power of the United States, having some twenty years ago visited many of our cities and towns, particularly Philadelphia, New York, Boston, &c, and I have heard him speak with delight, of the treatment he received from the late General Washington . . . . He is succeeded by his brother Tetchaho, alias Sinnawchewon, who is also an excellent Indian, and I have no doubt but that he will fill the place with credit to himself and friendship toward the U. States . . ." (Forsyth 1888:336-337).

Petchacho was identified as "one of two principal chiefs residing near the Illinois river" further in this letter.

A second example of the same kind is found incorporated in William Keating's narrative of the Stephen H. Long expedition of 1823. In reference to some Potawatomi case histories suggesting the presence of incest, Keating spoke of "another man belonging to the same nation, and who had become a chief by the death of his brother", the man's name being Ozanotap or "Yellow-head". Alanson Skinner (1923:25) lists Yellow-head as a name of the Thunder or Lightning clan.

Finally, the Collections of the Wisconsin Historical

Society (Matson 1876:415-421) contains a biographical sketch of a Potawatomi Chief, Shaubena, by Nehemiah Matson. Matson indicates the sketch was largely derived from statements made by Shaubena himself, gathered during visits while his band was hunting on the Bureau River, Illinois. Shaubena is said to be an Ottawa by birth who married the daughter of a Potawatomi chief and who succeeded to that office on his father-in-law's death.

Other instances need to be gathered for these examples indicate diversity rather than a pattern. However, there is one fundamental problem that seems difficult to resolve. What is the connotation of "brother" in the context of the first two examples? Does it refer to the use of the term, in a kinship sense, that would be the equivalent of our use of the word brother or should we interpret it in the light of the Potawatomi kinship system? Since the Potawatomi do have an Omaha type of kinship system there is a considerable extension of the equivalent of the term brother which applies both to different generations and also to lineage groups other than one's own. The difficulties are such that it might be impossible to be certain what is actually meant by such evidence.

CONCLUSIONS

Having reviewed the kinds of data available through ethnohistorical sources, we may now ask how these data conform both to the ethnological accounts and to the comparative reconstruction of Callender. Skinner's presentation stressed the office of "tribal" chief whose position was inherited in the Fish or Bear clan and who annually appointed a ceremonial chief. Landes more appropriately indicated that a chief had jurisdiction over a village but also stated there were three other "divisional" chiefs and that this office was inherited from father or elder brother. Ritzenthaler added few details, though in referring to "civil" chiefs he implied a distinction from war chiefs. In sharp contrast, Callender is specific in distinguishing war and village chiefs who were selected by a council from within a particular lineage. He again affirmed the existence of a tribal structure which, though weak, included a particular village chief recognized as chief of the tribe.

The ethnohistoric evidence cited leaves no doubt as to the recognition of two types of chiefs, each having a sharply differing function. The village chief would seem to have had greater freedom to name a successor than the ethnographic accounts would imply and while there might be a strong tendency to select a close relative this was not always done. Further there is no indication that either the Fish or Bear clan was customarily involved in the line of transmission of the chieftainship. On the basis of the ethnohistoric evidence it was denied that a tribal structure did indeed exist or that there were chiefs who held such an office as

tribal chief. While the concept of the Potawatomi as a nation or tribe perhaps develops through Federal treatment of them as though they constituted one, Clifton makes the interesting observation that Indian removal policy ". . . included the notion that the scattered segments of linguistic or cultural groups should be brought together in one place where the 'Nation could be united'" (Clifton 1965:104). Obviously, this would further reinforce the idea that they were a "Nation." Finally, Potawatomi folktales of earlier days recorded by Skinner seem to reflect a clearer picture of past institutional structure than did the specific statements of informants and would seem to be a valuable source of information when checked against historic data from the appropriate time period. It was assumed that tribes in the Upper Mississippi region shared common cultural patterns both as a consequence of acculturation and because they were subjected to similar historical influences such as the impact of the fur trade and the consequences of land sales and such resistance movements as that of Tecumseh. Indeed, it is these historical movements that led to the confused and disorganized state studied by the modern ethnographer.[2]

NOTES

[1]The author's interest in Potawatomi ethnohistory was aided, as have been many recent historical studies of the American Indian, by the concerns of the Indian Land Claims cases and specifically by support from the United States Department of Justice. It is of some interest to report in these days when disillusion with the integrity of our national institutions is indeed deep, that no attempt was made to suppress or distort the author's report though it clearly supported the Potawatomi claim and perhaps lost the case for the Justice Department.

[2]No comparisons have been made here with the admirable ethnohistoric treatment of the Potawatomi prepared by William Duncan Strong (1926) for in the account of the social and political organization he seems to have relied primarily on the ethnographic materials of Alanson Skinner. The brief compilation of ethnohistoric information by W. Vernon Kinietz (1940) for the period 1615-1760 sheds little light on Potawatomi political organization.

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ANIMAL RESOURCE UTILIZATION AT WISCONSIN EFFIGY MOUND SITES

Lois K. Lippold
San Diego State University

ABSTRACT

This paper reports the results of analyses of the faunal remains from Sanders I and III and Bigelow I and II, Effigy Mound sites in Wisconsin. Comparison is made between these sites and two other Late Woodland sites in Wisconsin for which comparable data are available. The analyses indicated that the sites were occupied seasonally most likely during the spring, summer or fall but probably not during the winter. Faunal inventories at all sites are characterized by a diminished species utilization in keeping with earlier Middle Woodland seasonal manifestations.

Detailed studies of resource utilization at Effigy Mound sites are not numerous. In order to supplement the knowledge of prehistoric economy during this period, faunal remains from several Effigy Mound sites were analyzed.

The Sanders sites I (47WP26) and III (47WP 70) and the Bigelow sites (47PT29 1 and 47PT29 2) identified archeologically as representative of the Effigy Mound Tradition afford a reasonable body of data. These sites were excavated in the summers of 1965 and 1966 under the supervision of William Hurley (1970). Faunal analyses were undertaken by me to reveal evidence of resource utilization and involved species identification, estimation of duration of occupation as well as the inspection of remains to ascertain butchering practices and patterns (Lippold 1971:67-95). Facts provided by the analyses are compared between each group of sites and then Bigelow and Sanders are compared to Effigy Mound sites already analyzed. These comparisons provide an understanding of the nature of animal resource utilization during the period of Effigy Mound construction in Wisconsin.

THE SANDERS SITES

The Sanders sites I (47WP26) and III (47WP70) are located on the property of the Sanders family, north of Fremont in Waupaca County, Wisconsin. Together the sites cover an area of approximately one-quarter of a mile square and are located on the first terrace above the Wolf River.

Sanders I, located within a woodlot approximately 2,000 feet north to south and 200 to 300 feet east to west, is fifteen to thirty feet above the present Wolf River. Sanders III is situated in a cultivated field immediately to the south of the woodlot containing the Sanders I site. Formerly part of the woodlot, this field was cleared of timber in the 1920's and has since been cultivated. Both sites are located on the southeastern shore of the Wolf River.

The woodlot vegetation of Sanders I reflects the transitional nature of its location within the present tension zone (Curtis 1959:20). The woodlot contains plant species representative of both northern and southern Wisconsin with typical representatives of the northern mesic forest being maple, yellow birch, white pine, white ash and ironwood. Species with more southern affinities are shagbark hickory, basswood, elm and several of the oaks (Lippold 1966:3).

Early survey records of 1843 and 1852 held by the owners reported the major trees to be maple, white and black oak, alder (near the river), willow, poplar, white birch, pine and hazel. These species do not differ a great deal from the extant species.

The Sanders sites are sites where effigy mounds were constructed and occupational detritus was deposited during Late Woodland times. Both typological and chronometric techniques were utilized to place the occupations temporally. Cultural remains suggest a Late Woodland placement since the mound types, the lithic assemblage (with triangular projectile points) and the ceramics (with Madison Cord Impressed and other Madison Ware types) all date from this period at other sites (Hurley 1970:912-945).

Twenty-seven radiocarbon dates (Bender, Bryson and Baerreis 1967:536-538; 1968:161-164) were obtained from both sites and generally demonstrate the continuity of the basic Effigy Mound Tradition from about 600 A.D. to at least 1100 A.D. and perhaps to as late as 1380 A.D. Four dates, however, seem out of place in terms of general Effigy Mound chronology (WIS-218, WIS-215, WIS-157 and WIS-205). The first of these (WIS-218, A.D. 290 ± 65, is anomalous in its earliness, while the last three, A.D. 1600 ± 60 years (WIS-215), A.D. 1610 ± 45 years (WIS-157) and modern (WIS-205), apparently date historic materials from the site.

Faunal Remains, Sanders I (47WP26)

Fauna recovered from Sanders I includes mound as well as habitation debris. Twenty species of vertebrates and one species of gastropod were recovered (Table 1). Mammals as a class accounted for forty-two percent of the identified elements, sixty-six per cent of the individuals represented and ninety-seven per cent of the total estimated pounds of meat.

Woodchuck, represented by seven individuals, accounted

for over 17 per cent of the identified elements, 21 per cent of the minimum number of individuals, but less than five per cent of the estimated pounds of meat (Table 1). However, all of these individuals are believed to be intrusive primarily because an inspection of the site area prior to excavation revealed a severe amount of disturbance caused by woodchuck burrowing activities. A large number of woodchuck homesites were in evidence. In one mound area alone no less than seven burrow entrances were counted. Also, upon checking the proveniences and excavation notes, it was found that some of the remains were found as whole skeletons in what appeared to be intruded tunnels within the mound fill.

Both elk and bear contributed more meat to the diet than deer. While deer contributed 22 per cent of the estimated pounds of meat, elk and bear contributed 39 and 23 per cent respectively.

Turtles were represented by 104 elements, which accounted for 30 per cent of the total elements identified. However, because of the small number of individuals (only three) and the small amount of usable meat per individual, they contributed less than one per cent of the estimated pounds of meat.

Evidence of butchering practices was difficult to ascertain since the distribution of deer elements was only suggestive. No antler was present and there was a complete lack of other cranial elements, although there were many tooth fragments of both maxillary and mandibular origin. Only a single lumbar vertebra was identified and no rib, scapula, humerus or radius were present. Elements of the hind limb were also lacking. This lack, coupled with the high numbers of shaft fragments suggested that these bones, if they had been returned to the site, were broken to gain marrow or perhaps in preparation for cooking.

Few remains were recovered which would allow the estimation of the sex of the animals or the season in which they were killed. However, a well worn left mandibular molar of a deer indicating an animal nearly eight years old was found.

Small animals such as muskrat were butchered in a particular fashion. Of all the muskrat elements recovered no carpals or tarsals were identified. This suggests that just the fore limbs, hind limbs and head were returned to the site since vertebrae and ribs were also lacking.

Faunal Remains, Sanders III (47WP70)

Materials recovered from Sanders III consisted primarily of vertebrates and some pelecypod fragments which could not be identified. Eleven species of vertebrates were recovered; five of mammals, two of reptiles, one of amphibian, and three of fishes. Mammals as a class accounted for 32 per cent of the identified elements, 50 per cent of the individuals and almost 94 per cent of the estimated pounds of meat (Table 2).

TABLE 1

VERTEBRATES AND MOLLUSCA IDENTIFIED FROM THE SANDERS I SITE (47WP26)
WAUPACA COUNTY, WISCONSIN

Species	Elements	Per Cent	Minimum No. of Individuals	Per Cent	Estimated Lbs. of Meat	Per Cent
Mammals	145	42.27	22	66.67	873.30	97.93
Marmota monax Woodchuck	59	17.21	7	21.21	39.20	4.40
Tamias striatus Chipmonk	3	.87	1	3.03	-	-
Sciurus carolinensis Gray Squirrel	4	1.17	2	6.06	1.00	.11
Castor canadensis Beaver	3	.87	1	3.03	38.50	4.31
Microtus pennsylvanicus Meadow Vole	3	.87	2	6.06	-	-
Ondatra zibethicus Muskrat	14	4.09	2	6.06	4.00	.45
Canis familiaris Dog	2	.58	1	3.03	8.60	.96
Urocyon cinereoargenteus Gray Fox	1	.29	1	3.03	4.50	.50
Ursus americanus Black Bear	1	.29	1	3.03	210.00	23.56
Procyon lotor Raccoon	2	.58	1	3.03	17.50	1.96

Cervus canadensis Elk	1	.29	1	3.03	350.00	39.25
Odocoileus virginianus White-Tailed Deer	52	15.16	2	6.06	200.00	22.43
Fragments	(1907)	-	-	-	-	-
Birds	1	.29	1	3.03	2.00	.22
Anas platyrhynchos Mallard	1	.29	1	3.03	2.00	.22
Fragments	(7)	-	-	-	-	-
Reptiles	104	30.33	3	9.09	7.00	.78
Chelydra serpentina Snapping Turtle	2	.58	1	3.03	5.00	.56
Chrysemys picta Painted Turtle	10	2.92	1	3.03	1.00	.11
Trionyx sp. Soft Shelled Turtle	92	26.83	1	3.03	1.00	.11
Fragments	(86)	-	-	-	-	-
Amphibians	54	15.74	4	12.12	-	-
Rana sp. Frog	54	15.74	4	12.12	-	-

TABLE 1 (cont.)

Species	Elements	Per Cent	Minimum No. of Individuals	Per Cent	Estimated Lbs. of Meat	Per Cent
Fishes	37	10.79	3	9.09	9.50	1.07
Lepisosteus osseus Gar	2	.58	1	3.03	1.50	.07
Ictalurus sp. Catfish	5	1.46	1	3.03	4.00	.45
Aplodinotus grunniens Drum	30	8.75	1	3.03	4.00	.45
Fragments	(166)	-	-	-	-	-
Gastropods: Terrestrial	2	.58	-	-	-	-
Anguispira alternata (Say)	2	.58	-	-	-	-
TOTALS	343	100.00	33	100.00	891.80	100.00

Woodchuck was, as at Sanders I, believed to be intrusive because of the nature of their deposition and the color of the bones. Also a number of woodchuck homesites were evident within the site area.

Deer accounted for four per cent of the identified remains, five per cent of the minimum number of individuals but 54 per cent of the estimated pounds of meat. Second, in terms of the meat provided was beaver since it afforded over 20 per cent of the estimated pounds of meat. Turtle represents the largest number of elements identified (139) of any class at the site, but added just over one per cent of the estimated pounds of meat.

Butchering patterns were again difficult to reconstruct due to the paucity of animals represented. Tooth fragments, tarsals, and phalanges constituted the entire inventory of identifiable deer remains. This was curious, but may be explained when the large number of unidentifiable mammal fragments is noted (1024). In many cases, these fragments appeared to be fragmented deer shaft and, if indeed they were, deer would probably have accounted for a higher percentage of identified remains.

A completely articulated skeleton of a horse was discovered in Feature 3. Close examination of the remains suggested that this animal was most probably a farm animal since it seemed of wide girth and rather short stance. The dentition revealed the horse to be at an age where tooth loss and malocclusion was a problem. It was concluded that the animal was a recent farm animal after discussion with the owners of the property revealed a practice of disposal of dead animals in hollows and tree throws in this field and adjacent woodlots.

Little information was available from which the season of site occupation could be deduced. Here turtle remains became important since they constitute a resource that is more available in the summer than the winter. Since turtles are less active from approximately October to May, and, hence, less available, a period of occupation during the summer months might be suggested.

The animal resources utilized by the occupants of the Sanders sites exhibit a distinctly water-edge to forest-edge orientation. The raccoon, beaver and muskrat are especially common in areas where water, accompanied by some cover, predominates. The gray fox favors the vicinity of streams and lakes and frequents hardwood-coniferous forests as well as heavily wooded areas in bottomlands. The meadow vole, likewise, recovered *in situ* at 47WP26 is a resident of lowland meadows or grassy marshes along rivers.

THE BIGELOW SITES

The two Bigelow sites (47PT29 1 and 47PT29 2) are located on the east bank of the Wisconsin River near Plover in Portage

TABLE 2

VERTEBRATES AND MOLLUSCA IDENTIFIED FROM THE SANDERS III SITE (47WP70)
WAUPACA COUNTY, WISCONSIN

SPECIES	Elements	Per Cent	Minimum No. of Individuals	Per Cent	Estimated Lbs. of Meat	Per Cent
Mammals	118	32.06	9	50.00	173.50	93.78
Marmota monax Woodchuck	68	18.47	4	22.22	22.40	12.11
Castor canadensis Beaver	2	.55	1	5.55	38.50	20.81
Ondatra zibethecus Muskrat	32	8.70	2	11.11	4.00	2.16
Canis familiaris Dog	1	.27	1	5.55	8.60	4.65
Odocoileus virginianus White-Tailed Deer	15	4.07	1	5.55	100.00	54.05
Fragments	(1024)	-	-	-	-	-
Birds	-	-	-	-	-	-
Fragments	(6)	-	-	-	-	-

Reptiles	139	37.77	2	11.11	2.00	1.08
Chrysemys picta Painted Turtle	19	5.16	1	5.55	1.00	.54
Trionyx sp. Soft Shelled Turtle	120	32.61	1	5.55	1.00	.54
Amphibians	100	27.18	4	22.22	-	-
Rana sp. Frog	100	27.18	4	22.22	-	-
Fragments	(164)	-	-	-	-	-
Fishes	11	2.99	3	16.66	9.50	5.13
Ictalurus sp. Catfish	2	.55	1	5.55	4.00	2.16
Ictalurus sp. Bullhead	1	.27	1	5.55	1.50	.81
Aplodinotus grunniens Drum	8	2.17	1	5.55	4.00	2.16
Fragments	(59)	-	-	-	-	-
Pelecypod Fragments	(14)	-	-	-	-	-
TOTALS	368	100.00	18	99.99	185.00	99.99

County, Wisconsin. Both sites are located within woodlots on a nearly level outwash plain approximately 100 feet above the river and are situated in a transitional plant community much like the one at the Sanders sites.

At the Bigelow sites effigy and conical mounds were constructed in Late Woodland times. Again, both typological and chronometric methods were utilized to date the sites. A ceramic inventory, much like Sanders and representative of a long period of Late Woodland occupation, was recovered from both Bigelow sites and included types such as: Madison Cord Impressed, Madison Plain, Hahn Cord Impressed and Heins Creek Corded Stamped (Hurley 1970:284-347).

A series of ten radiocarbon dates serves to set the sites temporally (Bender, Bryson and Baerreis 1967:538 and 1968:162). Two dates (WIS-192 and WIS-200) place the occupation of Bigelow I in the early ninth century A.D. (830 ± 65 A.D. and 810 ± 50 A.D., respectively) while a third date (WIS-227) was modern. Seven dates available from Bigelow II span a period from 670 A.D. ± 55 years (WIS-197) to A.D. 1610 ± 65 years (WIS-157). The last date appears late, apparently dating the historic component at the site (Lange 1969).

Faunal Remains, Bigelow I (47PT29 1)

Fauna recovered from Bigelow I was composed of both vertebrates and invertebrates. These materials in most instances came from mounds, with an extremely small amount coming from randomly placed test squares outside the mound areas. Three species of vertebrates and a single species of gastropod were identified (Table 3).

Mammals represented 88 per cent of the identified elements, and 100 per cent of the estimated pounds of meat. Nineteen elements of deer were recovered, representing at least four individuals. These individuals accounted for approximately 400 pounds of meat and almost 92 per cent of the estimated meat resources at the site (Table 3).

Evidence of a deer butchering pattern was scanty due to the small number of elements and the fragmentary nature of the bone. There were no ribs and only two deer vertebrae identified from the site. Only two tarsal elements, a right calcaneum and a right astragalus were present suggesting perhaps that the distal segments of the limbs were not returned to the site. Small numbers of both maxillary and mandibular teeth occurred and a single scapula with the blade missing was also recovered.

For deer the distal end of the tibia was by far the most commonly occurring element. Four right tibiae, broken immediately above the distal articulating surface suggests that the epiphyses were broken from the shaft perhaps to secure marrow, present in some quantity within the shaft. There was evidence of this type of breakage in other elements as well as for severance of the proximal end of a tibia and the distal end of a humerus occurred. Shafts secured by this

TABLE 3

VERTEBRATES AND MOLLUSCA IDENTIFIED FROM THE BIGELOW I SITE (47PT29 1)
PORTAGE COUNTY, WISCONSIN

SPECIES	Elements	Per Cent	Minimum No. of Individuals	Per Cent	Estimated Lbs. of Meat	Per Cent
Mammals	22	88.00	6	100.00	438.50	100.00
Tamias striatus Chipmunk	1	4.00	1	16.67	-	-
Castor canadensis Beaver	2	8.00	1	16.67	38.50	8.78
Odocoileus virginianus White-Tailed Deer	19	76.00	4	66.66	400.00	91.22
Fragments	(62)	-	-	-	-	-
Pelecypod Fragments	(5)	-	-	-	-	-
Gastropods	3	12.00	-	-	-	-
Anguispira alternata (Say)	3	12.00	-	-	-	-
TOTALS	25	100.00	6	100.00	438.50	100.00

TABLE 4

VERTEBRATES AND MOLLUSCA IDENTIFIED FROM THE BIGELOW II SITE (47PT 29 2)
PORTAGE COUNTY, WISCONSIN

SPECIES	Elements	Per Cent	Minimum No. of Individuals	Per Cent	Estimated Lbs. of Meat	Per Cent
Mammals	52	98.11	6	85.71	807.10	99.88
Castor canadensis Beaver	1	1.89	1	14.28	38.50	4.76
Canis familiaris Dog	4	7.55	1	14.28	8.60	1.06
Ursus americanus Bear	2	3.76	1	14.28	210.00	25.98
Cervus canadensis Elk	4	7.55	1	14.28	350.00	43.37
Odocoileus virginianus White-Tailed Deer	41	77.36	2	28.58	200.00	24.75
Fragments	(231)	-	-	-	-	-
Reptiles	1	1.89	1	14.28	1.00	.12

Trionyx sp.	1	1.89	1	14.28	1.00	.12
Soft Shelled Turtle Fragments	(1)	-	-	-	-	-
Pelecypod Fragments	(35)	-	-	-	-	-
TOTALS	53	100.00	7	99.99	808.1	100.00

process were probably subsequently destroyed in the preparation of bone grease, and a large number of shaft fragments do occur at the site.

Faunal Remains, Bigelow II (47PT29 2)

Remains from 47PT29 2 located approximately 1000 feet north of 47PT29 1 came from a series of mounds and test squares Five mammal and one reptile species were identified. Mammals accounted for 99 per cent of the estimated pounds of meat, and elk alone accounted for 43 per cent of this total. Bear and deer each represented approximately 25 per cent of the estimated pounds of meat (Table 4).

A single domestic dog was identified from four elements. The size of the skull and mandible indicated an adult dog approximately the size of a cocker spaniel. Although the appendicular skeleton of this individual was not retrieved the skull and mandible appeared to be buried as a unit.

The paucity of deer remains at Bigelow II makes any suggestion of butchering practices highly speculative. It does appear that a large portion of a few animals were returned to the site. The only elements missing from a rather sparse inventory were the ribs, scapulae and carpals. In contrast to Bigelow I vertebrae, tarsals and phalanges were relatively common at Bigelow II. Shattered long bone shafts were also relatively common at Bigelow II indicating the practice of marrow or bone grease preparation was common to both sites.

No deer elements were recovered indicative of sex ratio or seasonality. While three fragments of deer antler were recovered, all were from Burial Five in Mound A. These antlers appeared to be part of the grave goods, and it was not clear whether they represented animals of dietary importance to the occupants of the site.

It appeared rather peculiar that fish remains were not recovered from either of the Bigelow sites. Since both of these sites were probably utilized as campsites during mound construction, fish should have been immediately available in the adjacent river. If fish had been utilized, they should have been discovered for even if their remains had been burned or partly lost through chemical action of the soil, pharyngeal teeth of the drum (if utilized) would have survived as they did at the Sanders sites.

The paucity of faunal remains at both of the Bigelow sites is suggestive of an occupation of short duration; perhaps only during summers. Evidence to support this suggestion of season is admittedly scarce since it essentially rests on the appearance of some pelecypods, a few gastropods and one turtle which are more easily obtained in the warm months. However, it seems rather safe to assume that the mounds were built in the spring, summer or fall and not in the winter when the ground was frozen.

COMPARISONS AND CONCLUSIONS

The fauna from two other Late Woodland sites in Wisconsin have been analyzed: Mero and Heins Creek (Cleland 1966) and will be compared with the Sanders and Bigelow sites. Similarities are distinguishable between the sites. In all sites mammals were most important supplying between 73 (Mero) and 97 (Sanders I) per cent of the estimated meat resources (Table 5).

Deer was the most important food animal representing as high as 77 per cent of the estimated pounds of meat at the Bigelow II site. Only at Sanders I and Heins Creek (Cleland 1966) were bear (at both Heins Creek and Sanders I) and elk (at Sanders I) more important than deer.

Species totals, which were relatively low, ranged from three (at Bigelow I) to twenty (at Sanders I) with the most species variety occurring in the mammal class (Table 5). Late Woodland sites shared some species in common including deer, beaver, muskrat (except at Mero and the Bigelow sites), bear (at Sanders I, Bigelow II and Heins Creek), catfish (except at the Bigelow sites), and drumfish (except at the Bigelow sites and at Heins Creek).

While small mammals accounted for the species variation in most sites, large animals such as elk, bear, and deer provided the bulk of the food resources (Table 6). Birds, fish and pelecypods were poorly represented at all sites except Mero and Heins Creek where birds and fish combined accounted for 27 and 17 per cent of the meat resources respectively.

Butchering practices were similar among sites when they could be ascertained and generally compare to those described from Middle Woodland sites (Lippold 1973). Deer elements which commonly appeared were those of the hind limb, tooth fragments and some antler. Intact bones were uncommon, but distal and proximal ends of these bones were. The shafts of these long bones were apparently utilized as raw materials in the fabrication of tools and also in the preparation of bone grease. Deer elements most often missing were ribs and vertebrae.

Some small animals such as muskrat were returned to the site. However, this did not seem the case for all small animals. The most frequently occurring elements of raccoon, for instance, were skull and mandible fragments. Other animals appeared so infrequently that butchering practices could not be ascertained.

The sites included in this study reveal a site occupation which appeared seasonal in nature. No site could be proven conclusively to have been occupied year round. This seasonal occupancy is similar to the Middle Woodland component at Mero (Lippold 1973).

The diversity of resource utilization during the Late Woodland period is much diminished from that seen at Middle Woodland sites such as Cooper's Shore and Millville which saw

TABLE 5

LATE WOODLAND RESOURCE UTILIZATION

SITE	NUMBER OF SPECIES		NUMBER OF SPECIES PER CLASS					
			M	B	R	A	F	P
Sanders I	20		12	1	3	1	3	0
		%	(60)	(5)	(15)	(5)	(15)	(0)
Sanders II	11		5	0	2	1	3	0
		%	(45)	(0)	(18)	(9)	(27)	(0)
Bigelow I	3		3	0	0	0	0	0
		%	(100)	(0)	(0)	(0)	(0)	(0)
Bigelow II	6		5	0	1	0	0	0
		%	(83)	(0)	(17)	(0)	(0)	(0)
Mero	18		6	5	0	0	7	0
		%	(33)	(28)	(0)	(0)	(39)	(0)
Heins Creek	19		6	7	0	0	6	0
		%	(32)	(37)	(0)	(0)	(32)	(0)

TABLE 6 LATE WOODLAND RESOURCE UTILIZATION

SITE	BIOMASS PER CLASS M	B	R	A	F	P	THREE HIGHEST SPECIES IN ESTIMATED LBS. OF MEAT	
Sanders I	873.30	2	7	.01	9.50	0	Elk	39%
	(97.93)	(.22)	(.78)	(.00)	(1.07)	(0)	Bear	24%
							Deer	22%
Sanders II	173.50	0	2	.01	9.50	0	Deer	54%
	(93.78)	(0)	(1.08)	(.00)	(5.13)	(0)	Beaver	21%
							Muskrat	2%
Bigelow I	438.50	0	0	0	0	0	Deer	76%
	(100.00)	(0)	(0)	(0)	(0)	(0)	Beaver	8%
Bigelow II	807.10	0	1.0	0	0	0	Deer	77%
	(99.88)	(0)	(.12)	(0)	(0)	(0)	Elk	7%
							Dog	7%
Mero	174.00	18.50	0	0	47.00	0	Deer	42%
	(72.65)	(7.72)	(0)	(0)	(19.62)	(0)	Beaver	16%
							Sturgeon	15%
Heins Creek	395.60	17.50	0	0	64.00	0	Bear	44%
	(82.91)	(3.67)	(0)	(0)	(13.41)	(0)	Deer	21%
							Beaver	16%

more protracted occupation (Lippold 1973). Sites appear as seasonal collecting stations since no site could be convincingly proven to have been occupied on a yearly basis.

In conclusion, the basic nature of the Late Woodland-Effigy Mound resource utilization can be characterized as one of diminished species utilization as contrasted with many sites of the Middle Woodland Period. This basic pattern is a continuation of an earlier theme of economic adaptation seen at at least one Middle Woodland component in Wisconsin, at the Mero site.

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A NOTE ON THE TWIN BLUFFS PETROGLYPH SITE

John R. Seefeld
Department of Anthropology
University of Wisconsin-Milwaukee

One danger facing present-day archeologists is that of recent intrusion among older materials. If intrusion occurs in a manner not easily detectable, attribution can be incorrectly made.

An example of such a possibility is found at the Twin Bluffs petroglyph site, located in Juneau County about three miles west of the town of New Lisbon, Wisconsin. This site was first reported in the literature by Ritzenthaler (1947). In a later article (Ritzenthaler 1950) these petroglyphs were attributed to the Woodland peoples. This was justified as the petroglyphs appeared very similar stylistically to pictures and designs used by prehistoric and early historic Woodland peoples, such as the Menomini and Chippewa. The similarity was evidenced in such things as Midewiwin birch-bark scrolls, symbol signatures on treaties, and woven bag designs. Additional evidence came from the fact that in the Gullickson Rock Shelter in Jackson County, a rockshelter with very similar petroglyphs, artifacts were recovered which definitely belonged to a Woodland culture. From this evidence, Ritzenthaler (1950:190) concluded that the petroglyphs were prehistoric and, therefore, at least 300 years old.

Besides the description, a photograph of the petroglyphs taken in 1947 was presented by Ritzenthaler (reproduced here as Figure 1). As can be seen in a more recent photograph taken in 1972 (Figure 2), the site has been partially defaced, one example being a question mark in the middleground of Figure 2. More interesting, however, is the addition of another petroglyph! This symbol, located in the upper left of Figure 2, has been constructed to resemble the two crude thunderbird figures which are below it. The body shape, tail structure, and intaglio head have been copied from the lower left thunderbird, while the wing structure has been taken from the lower right thunderbird. Incisions were made to the same depths and the size is similar.

In the light of this recent rendering, and the fact that dated signatures on other areas of the rock are from the early 1900's, it is interesting to speculate whether all the Twin Bluffs petroglyphs are prehistoric in origin.

FIGURE 1

Twin Bluffs Petroglyph Site—1947
(Photo courtesy of The Milwaukee Public Museum)

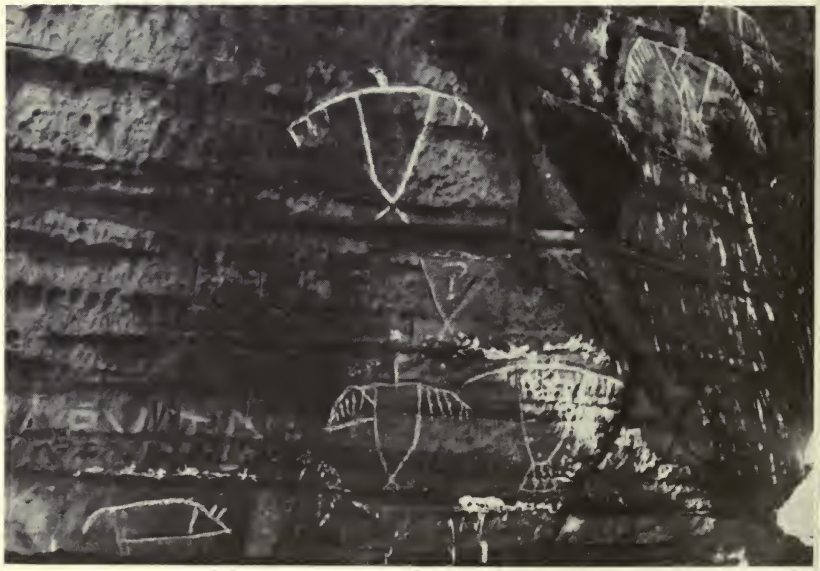

FIGURE 2

Twin Bluffs Petroglyph Site—1972
(Photo by author)

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BOOK REVIEW

Paleoethnobotany of the Koster Site, The Archaic Horizons. Nancy B. Asch, Richard I. Ford, and David L. Asch. *Illinois State Museum Reports of Investigations* No. 24. (also *Illinois Valley Archaeological Program Research Papers*, Vol. 6) Springfield, 34 pp. 5 figs. No price given. (Paper).

"More study is necessary." "Additional research is necessary." This is the way most research papers end; and it is how I begin this review. The ethnobotanical studies of Asch, Ford and Asch, while an important start, leave much to be discovered by future workers. To be sure, any initial study results in a certain amount of groping about for correct interpretations of data. This is the case with the study under discussion. Realizing this, the authors have skillfully couched their assertions in an admirable array of qualifying statements. While this is perhaps inevitable, it bothers a scientist who likes the security of a firm fact or two.

The paper describes the goal of an ethnobotanist, and, in general, how the Koster site lends itself to ethnobotanical studies. Following this introduction is a section on charred wood fragments, and a list of the genera and species that were identified. One cannot but admire the skill and patience that must have been necessary to make accurate identifications (even to genus) of these tiny burnt bits of cellulose.

Then the authors describe the nut fragments found. Hickory nuts (*Carya* of various species) are found in the greatest abundance in all the horizons. Hickory nuts are followed by oak acorns (*Quercus*), black walnuts (*Juglans nigra*), pecans (*Carya illinoiensis*), and lastly hazelnuts (*Corylus*). If nothing else, this indicates a certain economy of effort on the part of the early inhabitants of the Illinois River valley. Hickory nuts have large meats, are easy to gather, and are easily cracked open.

Then the seeds found in the various strata are discussed. Several of them are weedy; for example, ragweed (*Ambrosia*), pokeweed (*Phytolacca*), pigweed (*Chenopodium*), smartweed (*Polygonum*), and marsh-elder (*Iva*). This is, of course, logical; weeds thrive on moderately disturbed soils around human dwellin

Among the authors' conclusions is the assertion that little, if any, climatic change has occurred at the Koster site from year 5000 B.C. to the present. This is, I think, a bold hypothesis. To use the presence of *Carya* fragments to prove such an assertion is open to question. Some species of this genus grow in quite different habitats or climatic conditions from others. For example, *Carya ovata* is a wide-ranging hickory growing in alluvial and upland sites; *Carya myristicaeformis* is a tree whose range is restricted to southern lowlands and coastal areas. The authors themselves admit that their determinations are accurate only to genus. "These

categories, strictly interpreted, have only genus-level significance" (p. 3). Thus, two *Carya* fragments might be the remains of two trees of quite different climates or habitats. Further, evidence from the same site of varying climate has been found by a malacologist, Manfred Jaehnig, as reported in the *Smithsonian* for August, 1972 (p. 30), while Zawacki and Hausfater (*Illinois Archaeological Program Research Papers*, Vol. 1, 1972) state that they are unable to be sure about climatic changes even in the past 2000 years.

But whatever the shortcomings of the paper, much valuable data are presented, and several intriguing explanations are offered. Asch, Ford and Asch have begun well, but "more study is necessary."

David Kopitzke
Botany Department
Milwaukee Public Museum

BOOK NOTICES

Social Exchange and Interaction. Edited by Edwin N. Wilmsen. *University of Michigan Museum of Anthropology Anthropological Papers* No. 46. Ann Arbor, 1972. 147 pp. 10 figures. $3.00 (paper).

This volume is composed of seven collected papers sandwiched between a 3½ page introduction by the editor and a 6½ page summation by Kent V. Flannery. The papers cover a wide diversity of topics from ritual and exchange in aboriginal Australia (by Aram A. Yengoyan) to communal bison hunting on the northwest Plains (by George C. Frison) to the nature of trade carried on by Tewa pueblos of the Southwest (by Richard I. Ford) to an analysis of the Hopewell Interaction Sphere (by Stuart Struever and Gail I. Houart) to a discussion of market systems in modern Turkey (by Peter Benedict) to an analysis of the significance of interregional trade in Mesopotamia as exemplified by an archaeological site in Iran (by Henry T. Wright) to a consideration of political organization on Madagascar via a "cultural adaptive approach" (by Conrad P. Kottak).

The theme that attempts to bind these diverse papers together is that of exchange (of goods and services) as a form of social interaction. The volume is thus topical in nature and is unlikely to appeal to the reader whose major interests are more geographical than theoretical.

The Prehistoric People of the Fort Ancient Culture of the Central Ohio Valley. Louise M. Robbins and Georg K. Neumann. *University of Michigan Museum of Anthropology Anthropological Papers* No. 47. Ann Arbor, 1972. 713 pp. 2 figures and 54 plates. $6.00 (paper).

People *are* the subject of this volume, 732 of them to be exact. This sizeable sample of skeletal remains derives from the Fort Ancient culture of southern Ohio and the contiguous parts of Kentucky and West Virginia. The study was begun in 1937 by Newmann and was later taken over by Robbins who added to the original data in the process of writing her doctoral dissertation, which presumably served as the basis for this volume.

Despite its great length, only 109 of the volume's 700+ pages are devoted to text. The bulk of the remainder of the report is devoted to no less than 285 tables that record mostly mean measurements of cranial series derived from individual sites and to statistics derived from the raw measurements. A final appendix contains 54 line drawings of crania selected to illustrate the major varieties discussed.

Physical anthropology is, of course, what this volume is about. But, in the concluding chapter the author attempts to relate the implications of her findings to problems of culture history, particularly to the problem of what historic Indians were the descendants of the Fort Ancient culture (She feels, as did Griffin earlier, that the answer is most likely the Shawnee.). People concerned with the broader problems of Midwestern culture history are thus likely to find this work of more than passing interest.

NEWS AND COMMENTS

Guest Editorial by William P. McHugh

YOU CAN HELP

Members of the Wisconsin Archeological Society have the opportunity to contribute significantly to the preservation and study of Wisconsin's historic, prehistoric and natural resources. In the past decade or longer recreational, commercial, industrial, highway, and residential developments have altered many locales in the state. In many cases, the archaeological potential of these areas has not been determined and whatever sites were on these lands have been lost to study. An archaeological salvage and research program has been in effect for more than a dozen years where federally-funded highway and dam projects have been constructed or projected. It is now time to implement a comprehensive, state-wide program to assure that the state's archaeological resources are preserved, or where this is impossible, studied in the cases where they are threatened by the ever increasing number of projects now underway or in the planning stages.

As examples of the kinds of projects with which we should be concerned, I cite the following cases where archaeological surveys were performed. The proposed site of the Wisconsin Power and Light Company electric generating plant in Columbia County, five miles south of Portage, was surveyed to determine its archaeological potential and the need for excavations in June and July, 1970. The results were reported in *The Wisconsin Archeologist* (53[2]). Information on the project became available through newspaper accounts of the project. This information was brought to the attention of the officers of the Wisconsin Archaeological Survey and the State Archaeologist who acted to assure that the survey was done. More recently, an archaeological survey of a large area along the Flambeau River, Rusk County, just south of Ladysmith, was conducted in May of this year. The Bear Creek Mining Company plans to remove copper-bearing deposits, now deeply buried, by the open-pit mining procedure. As part of the environmental impact study of the project site, the mining company contracted to have the archaeological survey performed well in advance of any earth-moving activity. Again, initial information on the mining project came from newspaper reports. These are only two of many kinds of developments which threaten our state's archaeological resources.

Certain kinds of these projects, but by no means all of them, are required by the Department of Natural Resources to have proper environmental impact studies performed before the project is approved. The DNR requires that these studies include "the probable impact /of the project/ on air, water and land quality, plant and animal communities, scenic and esthetic features, and geological, historical, scientific and archaeological features, and outdoor recreational values." Thus,

projects which require DNR approval must include an evaluation of the archaeological potential of the project site as part of the environmental impact study. The DNR coordinates with the State Archaeologist of the State Historical Society to assure that this is done. The State Archaeologist may conduct the survey or may arrange for other professional archaeologists to do it.

Since not all projects are required to have DNR approval, not all of them will come to the attention of the State Archaeologist or other concerned archaeologists. It is important for us to have knowledge of all potentially destructive projects *as early as possible* in order to insure that all such project sites are properly examined for archaeological remains before any destructive activity gets underway. It takes quite a bit of time to make the necessary arrangements to perform the archaeological evaluation of an area; if it is to be done properly, sufficient time is needed to line up the personnel, prepare the equipment, secure financing, draw up a contract with the project company, etc.

I call on all members of the Wisconsin Archeological Society to seek out and collect information on such projects. With your knowledge and interest in Wisconsin archaeology, with your state-wide distribution, and with your business, professional and social contacts, you have the capability of acquiring the information needed to develop a comprehensive program for preserving, salvaging, and studying our state's finite archaeological resources. Watch your newspapers for reports of projects which may peril our prehistoric and historic archaeological sites. Solicit information on plant expansions, constructions of marinas, dams, shore-line developments, etc., especially in areas you think may be archaeologically productive. Send whatever information you collect to the president of your society. He will see that it is brought to the attention of the State Archaeologist and the Wisconsin Archaeological Survey. With the information you supply, we can begin a vigorous campaign to save and study our prehistoric and historic cultural resources.

AUTHOR INFORMATION

The Wisconsin Archeologist publishes original articles dealing with the anthropology (ethnology, physical anthropology, archeology) of the state of Wisconsin and adjoining regions of the United States and Canada. Articles of general topical and/or theoretical interest will also be considered.

All manuscripts submitted for publication must be typed on good quality, non-corrasable, 8½ by 11 inch white bond paper. Typing is to be on one side only, double spaced throughout, with at least one inch margins on all sides. Abstracts of up to 150 words are required. To be most informative, abstracts should emphasize what was learned or concluded as well as what was done. *No footnotes are permitted.* References to literature sources are to be included in parentheses within the text in standard anthropological style with the author's surname, date of publication, and pagination or other information. See examples in this issue. In a References Cited section at the end of the manuscript only those sources actually cited in the text are to be included. These are to be arranged alphabetically by author. For examples of typical bibliographic entries under References Cited, examine the papers in this issue.

All illustrations, including maps, line drawings, and photographs, will be published as Figures to be numbered consecutively in a single series (Fig. 1, Fig. 2). Tabular materials will be published as Tables and numbered consecutively in a different series than the Figures (e.g. Table 1, etc.). Both figures and tables must be provided with titles or captions and must be cited by number in the text. All illustrations must be submitted as black and white line drawings or as glossy prints, preferably in 8 by 10 inch sizes but no smaller than 5 by 7 inches. Be sure that photographs are sharp, clear, and have good contrast and that all illustrations are provided with a scale and/or a directional indicator where appropriate.

Authors should submit an original copy and retain at least one copy for themselves. Twenty reprints of each article will be provided free to each author.

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Volume 54, Number 4
New Series

December 1973

THE WISCONSIN ARCHEOLOGIST

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MILWAUKEE, WISCONSIN
Incorporated 1903

For the purpose of advancing the study and preservation of Wisconsin Indian Antiquities

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Entered as Second Class Matter at the Post Office at Milwaukee Wisconsin, 53201. Office of Publication, P.O. Box 1292, Milwaukee, Wisconsin, 53201.

THE WISCONSIN ARCHEOLOGIST

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PUBLISHED QUARTERLY BY
THE WISCONSIN ARCHEOLOGICAL SOCIETY

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CONSTRUCTING THE OJIBWA DANCE DRUM

Thomas Vennum, Jr.

ABSTRACT

Since its introduction in the late 19th century, the large dance drum spread rapidly among the Ojibwa (Chippewa) Indians and today survives their earlier drum types. The art of building such drums, however, is practiced by a diminishing number of Ojibwa who perpetuate traditional crafts. A step by step description of the recent construction of an Ojibwa dance drum shows how the craftsman, with modern tools and materials, continues to follow traditional Indian methods in building his instrument.

The art of drum making is rapidly disappearing among the Ojibwa, as are the crafts of hide-tanning and the building of birchbark canoes. Most drums used by the tribe today are commercially purchased bass drums of the marching band variety. In performance, these drums are turned on their sides, raised slightly by blocks, and played by the seated singers who surround them. The plastic heads of such drums produce a tone far inferior to the untanned hide heads of the traditional dance drum, but few today are willing to devote the necessary time and labor to prepare the hides, assemble and decorate an instrument.

Possibly one of the last of the Wisconsin Ojibwa to continue the building of drums according to traditional methods is 68-year-old William Bineshi Baker, Sr. Generally recognized as one of the foremost craftsmen on the Lac Court Orielles Reservation in northwestern Wisconsin, Baker is also active as a singer, religious leader, and teacher of the Ojibwa language.

Among his people, Baker alone possesses the spiritual authority to construct a smaller version of the dance drum, called idwe da-weigan (ikkwe:te:we:'ikan),[1] or woman's dance drum. This authority provides him with a compelling reason to perpetuate the craft. Nevertheless, the general disinterest of his people continually frustrates Baker in his efforts to perpetuate such traditions. Several years ago, for example, he wished through the drum to honor the memory of his mother with a dance. Following Indian tradition, he sent out the customary tobacco invitations. Those whom he wanted to participate defied tradition by declining the offer, and Baker remains understandably embittered by their refusal to attend.

OJIBWA DRUM TYPES

Of the three principal drum types known to have been used by the Ojibwa, the dance drum—da-weigan (te:we:'ikan)—is the only one found in general use today. The second principal type was represented by the mitigwakik (mittikwakkikk), a single-headed water-drum carved from basswood or cedar and used in the religious ceremonies of the mite:wiwin, or Grand Medicine Society. This drum had for the most part disappeared by the 1930's, when that religion became moribund.

The third principal type included a number of double-headed drums with narrow frames in the shape of a tambourine, Among these were the okicitak da-weigan (okiccita:k-te:we:'ikan), or warrior's drum; the medical practitioner's drum, called si:ssikwan (rattle), which contained pebbles or shot and functioned alternately as a drum or rattle; and the drum used by players of the moccasin game. (Some moccasin game drums had single heads; others were provided with internal snares.) A similar tambourine drum had been used for the dances of the Ojibwa before the introduction of the large dance drum. It is occasionally found today in the "Chief" dances; the others of this type have not survived.

THE DRUM DANCE

The dance drum is said to have been given to the Ojibwa by the Sioux to establish a lasting peace between the two tribes. For this reason it is frequently called the pwa:nši-te wa 'ikan, or Sioux drum. The time and place of its first presentation have been the topic of considerable debate, but the common belief is that the first presentation occurred ca. 1880 somewhere in central Minnesota.

According to Rohrl (1968:131), the first drum presentation took place at Mille Lacs Lake ca. 1865. Armstrong (1892-156-60) was witness to a Drum Dance near Ashland, Wisconsin, in 1878 and claimed to have spoken at that time with the Sioux woman who initiated the ceremony after surviving the Custer massacre at Little Big Horn. Armstrong, who dictated his reminiscences late in life, admits to possible inaccuracies in his dating of events. (Some confusion, at least, is evident in his mistaken identification of the Ashland event as the "Ghost Dance.") Armstrong's report prompted a heated exchange of views on the origin of the Drum Dance between Truman Michelson and Alanson Skinner which was printed in the *American Anthropologist* over a period of four years, beginning with Michelson 1923.

The legends used to explain the origin of the dance drum vary in detail, but they tell the same story: while fleeing from soldiers of the United States Army, who had killed four of her sons, a Sioux woman took refuge in a lake. As she hid there, she was visited by the Great Spirit, who instructed her to convey his wishes to her people that they construct a

special drum and honor it. By this means the bloodshed would be ended. He then showed her how to make the drum and taught her the songs which were to be performed on it. The woman returned to her people and carried out his commands, and the first drum they built was brought to the east and given to the Ojibwa.

Since that time the drum has been passed from one Ojibwa community to another, together with the "preaching" of the drum, the songs, and certain ritual observances. (Various names have been used for the ceremony, the most common being Drum Dance, Dream Dance, and Powwow.) From the Ojibwa, the Drum Dance spread to their neighboring tribes—the Menominee, Winnebago, and Potawatomie. When "giving away" a drum, the donor community retains some part of the drum paraphernalia—the tobacco box or one drum leg, for instance—which will be incorporated into the new drum that must be built as a replacement. In this way all drums are thought of as "related," since they have common ancestry in the original Sioux drum.

Drum Societies today are quite active on Ojibwa reservations, and while the Drum Dance is not formally a religious ceremony, in many ways it functions as one. The Societies lack the elaborate hierarchy of membership, set of beliefs, and ritual observances of mite:wiwin; however, the Drum Dance rituals can be shown to embody certain procedures and symbolism which are vestiges of Grand Medicine. For instance, the Henry Davis drum ceremony at Mille Lacs Lake, Minnesota, features a young girl, who blesses the food and gifts. The girl is positioned on a blanket to the west of the pile of goods which are to be distributed to all in attendance (Howard 1966:122). These actions have their parallel in the mite: ritual called "Seating the Candidate": the person to be initiated is seated at the west end of the medicine lodge facing the pile of goods or fees to be divided among the officers of the ceremony as payment for their services (Landes 1968:129ff.).

Descriptions of the ceremonies of the Drum Societies are numerous. The earliest accounts, however, are usually incomplete and do not mention the Drum Dance by name. Typical of these is Bushnell's report (1905) of a ceremony held in 1899. Such features as Bushnell describes—a circular dance ring, the wearing of the eagle-feather bustle, and an elaborately decorated 30" drum with apron, tabs, and curved stakes—leave little doubt that this ceremony was a Drum Dance.

As the Drum Dance spread among the Ojibwa, it found many adherents in members of the Grand Medicine Society. Although these mite: priests adopted the new rituals, most of them continued the practices of the older religion as well. Membership in both Societies may overlap even today. Consequently, some early reports of ceremonies are ambiguous in defining which of the two Societies it is whose functions they describe. Gilfillan, for instance (1901:60-61), gives an account of the "continuous medicine feasts" conducted at White Earth

Reservation (Minnesota) in 1873 by a group of Grand Medicine men. Several details from his description of the event suggest that the ceremony was a Drum Dance and not a function of the mite:wiwin, as Gilfillan implies. For example:

*The time of year—January—would have been unlikely for a ceremony of the Grand Medicine Society, which traditionally held its initiations in the autumn and spring. However, the time would be consistent with the practices of the Drum Societies, who continue to hold dances in each season.

*Gilfillan notes that the ceremony was brought to White Earth by a group of 60 men from another reservation, who caused considerable excitement with it. Because orthodox mite·wiwin flourished at White Earth, a Grand Medicine ceremony at that time would scarcely have created a stir among the residents, whereas a Drum Dance in 1873 on that reservation might well have been a novelty.

*Gilfillan draws particular attention to "the *big* medicine drum" (Italics mine), which the visitors brought with them, probably to distinguish it from the smaller water-drum generally associated with the mite·wiwin. (It is possible that the "big drum" was presented to the White Earth band during the ceremony.)

*While dog feasts were also a part of Grand Medicine initiations, such feasting as Gilfillan describes lasted for weeks (the visiting Red Lake delegation was said to have consumed so many dogs that its members went home barking!). The duration of this ceremony is more consistent with the length of time occupied by Drum Dances in former years than with the usual duration of the medicine dance, which, without its preliminaries, could be disposed of in a day's time.

Many accounts of the Drum Dance are based on ceremonies which have been tempered by local visionaries. Frequently the variations are tinged with Christian elements (e.g., see Howard 1966, where the ceremony is held on Easter Sunday, and a young girl dressed in white blesses the gifts, while a special "Virgin's Song" is performed). The most detailed account of a Drum Dance (Barrett 1911) describes a variant replete with Christian symbolism. The ceremony was practiced early in this century by a cult which developed around Steve Grover, a visionary in the community of Whitefish on the Lac Court Oreilles Reservation. The Whitefish departures from orthodox practice were based on a series of visions ca. 1901 received by Grover and a young girl, who instructed their people, among other things, to erect a large red cross in the center of the dancing circle and to venerate it with certain rituals during the ceremony. (In the dances, Grover wore a vest with the red cross emblem on its back.)

Because of its length and early date, Barrett's account unfortunately continues to be accepted as a standard description of the Drum Dance, although conservative members of Grover's reservation considered him a heretic (see Casagrande 1955:119). When Baker was shown this report, he seriously

questioned many of the practices of the cult which Barrett describes. (There is a non-Christian variant of the Drum Dance in Landes 1968:207-12, the ceremony having been revealed to the visionary Maggie Wilson in Ontario during World War I as a means of protecting members of her tribe who were fighting overseas.)

By far the most valuable account of Drum Society activities is Frances Densmore's chapter describing the presentation of two Ojibwa drums to the Menominee in October 1910 (Densmore 1913:142-83). The ceremony she describes probably represents the most orthodox practice. (For more recent reports of the Drum Dance, see Blessing 1961 and Rohrl 1968.)

CONSTRUCTION OF THE DRUM

The following is a step by step description of the construction of the dance, or powwow, drum such as is used in the ceremonial Drum Dance. Previous descriptions of these drums have emphasized solely their mode of decoration without considering the procedure of their manufacture among the Ojibwa.

The drum I describe here was made by Baker in May 1970, while he visited me in Concord, New Hampshire. I wanted to observe the construction of such an instrument partly because my interest had been aroused in the summer of 1969 when I made several trips on his behalf to a rendering plant some 60 miles south of his reservation in order to obtain hides of freshly slaughtered cows for his drum heads. Invariably the skins I brought him had imperfections I had not observed when I bought them. Usually these were small holes made by botflies, which had burrowed through the hide to escape (a common cattle affliction). Such holes rendered the skin useless for a large drum head because it would tear under tension, although parts of these skins were sometimes salvageable for smaller drums. (Baker had stacked a number of these, in various stages of completion, in one corner of his house.)

For the body or frame of the drum, over which the drum heads would be stretched, Baker said that an old-fashioned wooden washtub was ideal. Because these were generally unavailable except as highly priced New England antiques, we searched instead for a pickle or wine barrel with oaken staves. We found two in the woods, but rejected them because the staves were rotten. Then we discovered a nearly new oaken barrel in a neighbor's rubbish pile. Baker sawed off the bottom of the barrel at a height of 13½", giving the top of the drum frame a diameter of 24". (The bottom of the barrel had a diameter of 20".) With a hammer and screwdriver, he drove the two metal bands toward the larger end to force the staves tightly together. Then he cut a hole about 12" in diameter in the center of the bottom of the barrel. Next Baker fit a circular piece of plywood inside the barrel and screwed the plywood to what remained of the original bottom.

Because it butted against the staves at the bottom of the drum frame, the plywood offered more uniform bracing than the loosely fitted planks of the original barrel bottom, which would have shifted under the tension of the drum heads.

At this point Baker cut four leather straps, which would suspend the drum when it was drying and, later, when it was in position for performance. These straps were looped and secured with screws to the sides of the frame about 5" from its top and equidistant from each other, so they would hang from the stakes which are customarily oriented to the four cardinal directions when the drum is in use. Finally, a hole about 12" in diameter was cut in the center of the plywood and made even with the hole in the planking to make the frame hollow for the double heads (Fig. 1).

In the meantime, a large bull's hide obtained from a local slaughterhouse within minutes of its removal from the animal had been soaking for nearly a week in a metal oil drum filled with tepid water. The soaking process causes the hide to begin to putrefy, which is necessary to loosen the hair roots sufficiently to allow their removal. Soaked skins in an early condition of putrefaction are called "green" hides by the Indians to distinguish them from hides which have been left simply to dry in the sun. (The "green" hides of deer are used in the preparation and tanning of buckskin.) In former times deer or moose hides were used for drum heads; as a substitute, Baker's preference is for a cowhide from an animal no older than two years. Baker stresses the importance of procuring skins from freshly slaughtered animals, because most rendering plants "salt down" their hides soon after removing them from the carcasses, to preserve them en route to tanneries. A recently salted hide can sometimes be salvaged through washing and soaking, but if the preservative has penetrated too deeply into the skin, it is useless for a drum head.

After cutting off what extraneous bits of fat and flesh still adhered to the underside of the skin, Baker required something to serve him as a "beaming post" for the removal of the hair. Formerly, the Ojibwa used a peeled log, one end of which was propped up, the other resting on the ground. The hide was hung over this, hair side up, for the scraping procedure. (See Ritzenthaler 1970:Plate 35, for a photograph of this process.) Lacking a proper beaming post, Baker chose a sawhorse as a substitute. Its crossbeam was too narrow and flat, however, so he nailed boards to either side of it and rounded off the combined surfaces by whittling them with a pocketknife to simulate the surface of a log. For a beaming tool he used a heavy metal file about 12" in length which had flat edges.

Straddling the sawhorse and grasping the file with both hands, Baker began the laborious task of scraping all the hair from the hide, strip by strip in swaths no more than ½" wide, because of the rounded surface beneath the skin. This process required nearly two days, after which the hide was

FIGURE 1 - Sawing the plywood bracing for the bottom. Note the "v" shaped sections of the tree on the ground behind Baker to be used for hooks on the drum stakes. Photo by N. T. Wheelwright.

FIGURE 2 - Sewing the ribbon on the skirt. Note the beads at every stitch. Photo by N. T. Wheelwright.

thoroughly rinsed and carefully examined for any remaining bits of hair or fat which needed removal.

From the thickest portion of the hide—that part which had covered the animal's shoulders and back—Baker cut each of the two drum heads to about 10" larger in diameter than the frame openings. Parallel to the edges of these drum heads and about 1½" in from their circumferences, he made incisions with a pocketknife approximately 3" apart, which would receive the lacing. About 10 yards of strips 1" wide were sliced for lacing from the leftover pieces of hide, and the drum was set on a table, resting on its bottom head, to begin threading the strips through the incisions. (Before this step in the construction of ceremonial drums, a thong with a small bell attached to it is customarily fastened across the inside of the frame partway down from the sides to produce a jingling sound whenever the drum is beaten. The Ojibwa call this the "heart" of the drum.)

Baker began the threading by making an incision near each end of the first strip, rather like the eye of a needle. One end of this strip was then threaded through one of the incisions near the edge of the top head, then doubled back on itself through the "eye" on its opposite end, and finally pulled all the way through these holes until taut. The same procedure was used to extend the lacing each time a new section was required, the "eye" of the previous strip serving in place of the incision near the edge of the head. The threading alternated from head to head and was left quite loose until completed.

Going around the drum several times, Baker tightened the lacing as he went and ensured that the heads were evenly centered on the frame and the tension between them was uniform. Finally satisfied, he cut the excess lacing, and after threading the loose end through one of the head incisions, he knotted it to itself. The drum was then suspended from the rafters of the garage with ropes tied to the four leather handles.

Nearly five days were required for the drying process. At first it had appeared to me that the heads were too limp and the lacing much too loose ever to tighten sufficiently. Gradually, however, the top head began to shrink, although the bottom head continued to bulge like a balloon full of water, as all the moisture in the skins began to collect on it and seep through. By the fourth day the top was completely dry and the bottom only damp in its center, where the last of the water had dripped through. When the drum was taken down, we sprayed it with disinfectant frequently for several days to eliminate the strong odor of the rawhide.

While the drum was drying, Baker was occupied making the customary decorations for the instrument. From pile of scrap cloth in my closet he selected a sizeable piece of red velvet which he fashioned into the skirt or apron for the drum. This hangs freely around the instrument and reaches from the top edge to 4" below the bottom. Some drab madras muslin in a striped pattern was chosen for a 6" strip sewn onto the velvet

at the top of the drum. (All sewing was done by hand.) Baker stitched yellow satin ribbon to the lower edge of this strip, and where each stitch showed, he had inserted two small ("seed") beads of light blue color (Fig. 2). The four pocket-shaped tabs which are customarily spaced between the cardinal points were also made from the madras with ribbon edging and their faces decorated with crossed strips of ribbon and rows of beads forming abstract designs.

For the beads and ribbons on the tabs, Baker chose a variety of colors: light blue, pink, orange, white, and red. (In the elaborate ceremonial drums, the tabs and 6" strip are fully beaded, usually in the typical Ojibwa floral patterns, but occasionally with religious symbols, such as open palms representing "the hands of God.") From an old mink coat donated by a neighbor, he cut a 2" band of fur to surround the very top of the drum (beaver or otter fur are preferred when available). The skirt with its tabs and the fur strip was then nailed together to the side of the drum along its top edge, using brass furniture tacks at 6" intervals, with bits of colored ribbon impaled on the tacks.

Baker sat for a long time in silence before the completed drum, then inverted it and did the same. Confessing that the drum was one of the best he had made and joking that he was therefore loath to give it up, Baker finally entrusted it to my care. In doing so, however, he was careful to point out that this was only a "fun drum." That meant that although its construction and most of the decoration conform to the ceremonial drum, it lacked the mandatory ritual consecration of the ceremonial drum, when it is beaten for the first time using the paka'a:kkokkwa:n, a specially decorated drumstick (see Barrett 1911:266-67, 303). As simply a "fun drum," its use was therefore restricted to "good times." Baker is very earnest in making such distinctions, and I recall his anger during a strictly social powwow at Mille Lacs Lake, Minnesota, where a ceremonial drum was being used for the dance. Tradition requires that such drums be taken down from their stakes before the setting of the sun, and in this instance the singers had simply gone off in the late afternoon for their supper and neglected their duty to the drum, which remained suspended as evening approached.

Another requirement for ceremonial drums is that a yellow stripe be painted down the middle of the top head, which in ceremonial dances is always oriented on an east-west axis to represent the path of the sun. The north half of the head is then painted blue, the south half red, symbolizing the dark and light skies, the coldness of winter and the warmth of summer. Baker gave me permission to paint the top of this drum as I desired, but since it is a "fun drum," I decided to leave it in its natural rawhide color.

Baker made several drumsticks to be used with the drum. For the body of the sticks he insisted on sections from plastic fishing rods, for he felt they provided the proper resiliency. The lengths of these averaged about 19" after

he had removed the metal fixtures from both ends. Each thick section (the part of the rod nearest the reel) served for one stick, while thinner sections were taped together to achieve the desired thickness. Baker then wrapped strips of cloth at either end to flesh them out to a ½" thickness. This padding extended inward from the handle end for 4" and from the beater end for 6". The entire stick was then covered with a single narrow strip of buckskin, which he stitched together with thread, forming a seam down the entire length of one side. For decoration, he sewed a small strip of fur around the middle of two of the sticks.

When compared with most drumsticks used by contemporary Ojibwa, these sticks are unique for their thinness, elasticity, and covering. Most singers of the tribe today use a commercially available drumstick or a homemade variety, which has a wooden handle and a large fluffy cotton end, similar to a soft bass drum beater but with a longer handle and a smaller cotton ball. The thin beating end of Baker's drumstick is much closer to an older type of Ojibwa stick, which has only the beating end wrapped with strips of cloth or buckskin. (See Fig. 12 in Hoffman 1891:190, showing the dance drum and medicine drum side by side with their respective drumsticks.) The padding in these older sticks is much thicker due to their lozenge shape, whereas the sticks Baker makes are of a uniform thinness. His drumsticks bear a close resemblance to those used by the players of the moccasin game drums, whom Densmore photographed at White Earth Reservation in Minnesota in 1910 (Densmore 1913:Plates 27 and 28).

Baker also began to make the four stakes used to support the drum, but these have not yet been completed. He selected white ash saplings about 1" thick, cut them to 4' lengths, and peeled the bark from them (Fig. 3). Each sapling was nailed against the wall of the garage between the studs, forcing a bend beginning near the top of the thinner end of the wood, and allowed to dry in that position. (When supporting the drum, these crooks in the drum stakes face outward from the drum and always have an eagle feather or two suspended from their ends or projecting upward at the point of the bend, in the manner of a roach headdress.) Baker then carved the four hooks to hold the leather drum straps. For these he chose parts of a sumac bush where a branch projected from the trunk forming a naturally sturdy "v" shaped hook (see Fig. 1). Later these would be lashed to the stakes with rawhide at a height which would raise the drum about 4" off the ground. When completed, the four stakes are customarily decorated with a combination of paint, ribbon, fur, and wrapped yarn. To suspend the drum, holes for the four stakes are generally driven into the ground with a crowbar and the stakes inserted. Some Drum Societies, however, use a stand made of two crossed pieces of wood with holes drilled in their ends to seat the stakes.

After the drum had been completed, we purchased a heavy

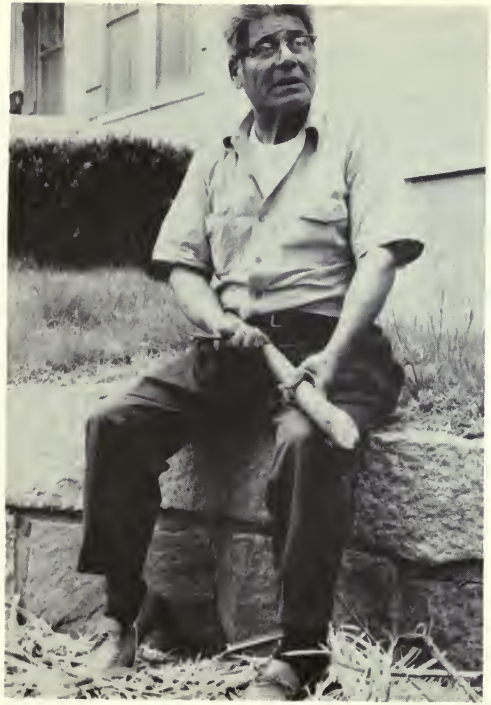

FIGURE 3 - Peeling the bark from ash saplings. Note the position in which the knife is held, customary when using the traditional Ojibwa "crooked knife" which is drawn toward the user. Photo by N. T. Wheelwright.

FIGURE 4 - The completed drum with drumsticks and its cover beneath it. The stand is not traditional and was made by the writer to serve temporarily until the stakes were completed. Photo by J. Coorad.

cotton fabric to make the cover in which the drum is traditionally kept. The depth of this sack—nearly 4'—facilitates carrying the drum. Usually one simply gathers the top of the sack together and throws the drum over the shoulder. Densmore (1913:Plate 19, opp. p. 145) shows the carrying position, although no sack is used. In the homes of many Ojibwa and Menominee drum custodians, the top of the sack is tied to a crossbar in one corner of the room, so that the drum is suspended, indicating the high regard in which it is held. For ceremonial dances, when the drum is lifted onto its supporting stakes, the cover remains on the ground beneath it, where it was peeled off the sides of the drum (Fig. 4).

This drum was damaged sometime during the year following its making. One of the metal bands holding the staves had somehow buckled outward in the final drying process and caused a sizeable tear in the smaller head. The tear was beginning to work its way past the edge of the framework and onto the bottom when it was discovered by Baker, who noticed that the tome of the drum had changed appreciably. To repair the damage, he cut the metal band with a hacksaw where it had buckled. Then he overlapped the two metal ends and flattened them. Wet sponges were left over the tear for several days to soften the skin, while strips of rawhide lacing purchased from a sporting goods store were soaked in warm water. When the skin was pliable enough to cut, Baker made several incisions on either side of the tear and laced it up with the rawhide strips, intertwining these with the original lacing, which was still intact. After a few days of drying, the rawhide lacing had shrunk sufficiently to close the tear somewhat and prevent its spreading. Since that time no further problems have arisen. The drum's excellent deep tone has been restored, and the writer is honored to continue as its custodian.

NOTES

[1]At Baker's request, I have used his spellings for several Ojibwa words (these are underlined). All italicized Ojibwa words in this paper are transcribed according to the system of Bloomfield 1957, with the exception that the reduced vowels indicated in Eastern Ojibwa with e (short) and u do not occur in the dialect represented here. Two diacritical marks have been substituted for Bloomfield's: the single apostrophe (') to represent glottal stops, the colon (:) to indicate vowel length. Baker's Indian name Bineshi (bird) in Bloomfield's system is pine·ssi. For assistance in linguistic matters, the writer is indebted to John D. Nichols, Department of Linguistics, Harvard University.

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THE LAKE LAWN MOUND GROUP

James A. Brown
Northwestern University

ABSTRACT

The Lake Lawn Mound group, located in Walworth County, Wisconsin, was composed formerly of about 100 mounds, apparently all assignable to the Effigy Mound Tradition. Charles E. Brown reported 51 of the mounds still surviving in 1926, while only 23 remain today. In 1955 two of these mounds were tested by a group from the University of Chicago. This paper describes the results of these excavations, including features of mound construction, four burials, and eight artifacts that were recovered.

INTRODUCTION

The Lake Lawn Mound group is located on the north shore of Lake Delavan in Walworth County, Wisconsin, on the property of the Lake Lawn Lodge in the SW¼ of SW¼ of sec. 15, SE¼ of SE½ of SE¼ of sec. 16, NE¼ of NE¼ of sec. 21, and NW¼ of NW¼ of sec. 22, T2N R 16E. The group was originally composed of about 100 mounds, of which only 51 survived long enough to be recorded in the early part of this century (Brown 1926:15; See Fig. 1). Today, due to erosion, cultivation and construction only 23 mounds remain. The surviving mounds have probably not been left undisturbed although this is difficult to evaluate accurately. Fortunately, many of the mounds are located on unplowed land so that their main constructional features are still preserved. The entire mound group is apparently assignable to the Effigy Mound Tradition.

During the fall of 1955 the Campus Archaeological Society of the University of Chicago excavated parts of two mounds, numbers 10 and 18 (Fig. 1), with the encouragement of the proprietors of the Lake Lawn Lodge. A total of five days were spent in excavation. The only other recorded digging in the mound group was made by the Phillips brothers in 1911 and 1912 (Brown 1926:18-20).

The excavation procedure consisted of the following. First, the greater part of each mound was staked out, and the sod was carefully removed. The squares that were selected for excavation were taken down to the undisturbed clay by stripping with shovels in shallow levels. This technique was followed throughout in both mounds except in the north-south trench of Mound 10 (Fig. 2). In the latter case the

FIGURE 1

Map of Earthworks, Lake Lawn Mound Group, Walworth County, Wisconsin. Taken from draft map of the 1920's. Hotel facilities shown stippled.

northern-most square was excavated first down to the basal clay and the remainder of the trench was sliced vertically with mattocks starting at the north and continuing to the south. Where pits were found, they were first isolated, then excavated with a trowel. At their junction with the trench walls, cross-sections were made by cutting through the feature into the subsoil. Samples were taken of the ash and carbonized wood in anticipation of future analysis.

Topography

The Lake Lawn Mound group is located between the inlet and outlet streams of Lake Delevan. At this location the mound group occupies only the area of well drained soil. This soil, called Carrington Silt Loam, indicates an area of formerly well developed prairie (Whitson *et al*, 1924). At the present time this prairie has been replaced by a stand of open oak woodland. The topography of the area is characterized by a gentle rise from the lake shore towards a slight ridge around the 15/22 section line. On this ridge most of the recorded mounds occur. Further back from the lake to the north, the land was originally relatively flat, and the present topography has been created with the construction of a golf course. The mounds that were once located in the flat area have been obliterated by farming and golf course construction. North of the flat area there is a concentration of mounds on a slight rise just south of Highway 50. A decided preference in the location of mounds on rises above the general terrain is evident, a preference that was apparently widespread within the Effigy Mound Tradition (Rowe 1956:68).

THE MOUNDS AT LAKE LAWN

Mound 10

The surface outline of this mound seemed to identify it as a linear mound, but excavation demonstrated that it was actually an oval mound (Fig. 2). The construction of the mound can be divided into two parts: 1) the prepared base on the "floor" of the mound together with its associated features, and 2) the mound fill.

The mound floor was defined by an area in which the topsoil had been removed and the features constructed on and into the undisturbed glacial clay. In the profile sections the floor zone could be conveniently identified by the zone in which small undulating layers of compact clay were found. The floor was evidently prepared by the removal of all humus, which at Lake Lawn was quite thick, and perhaps by some limited excavations into the subsoil (Fig. 3). The limits of the prepared area is estimated from the results of the tests (Fig. 2). The center of the floor was occupied by clusters of stones together with some gravel. Nearby a small concentration of ash and burnt clay was found. At the ends

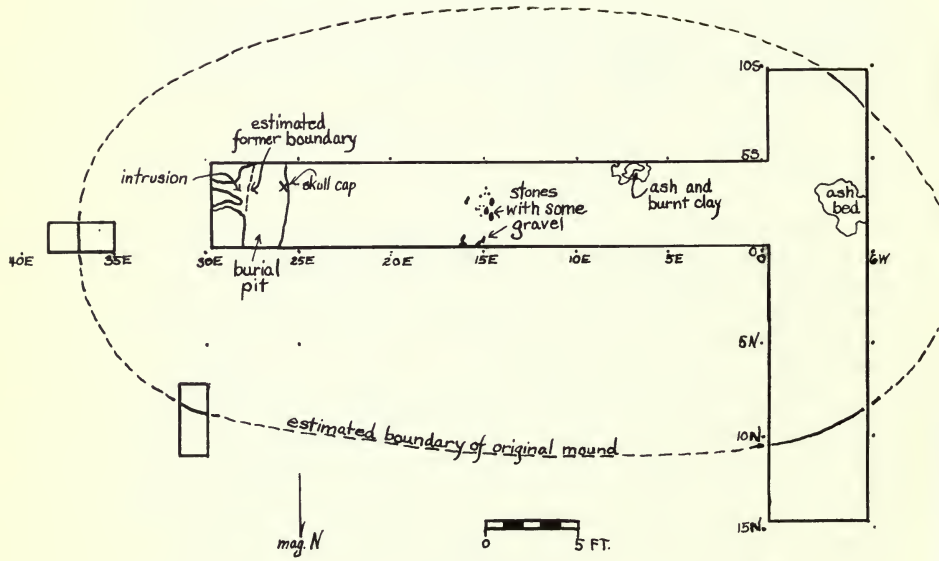

FIGURE 2

Sketch map of Mound 10 showing estimated boundary of mound, area excavated and features.

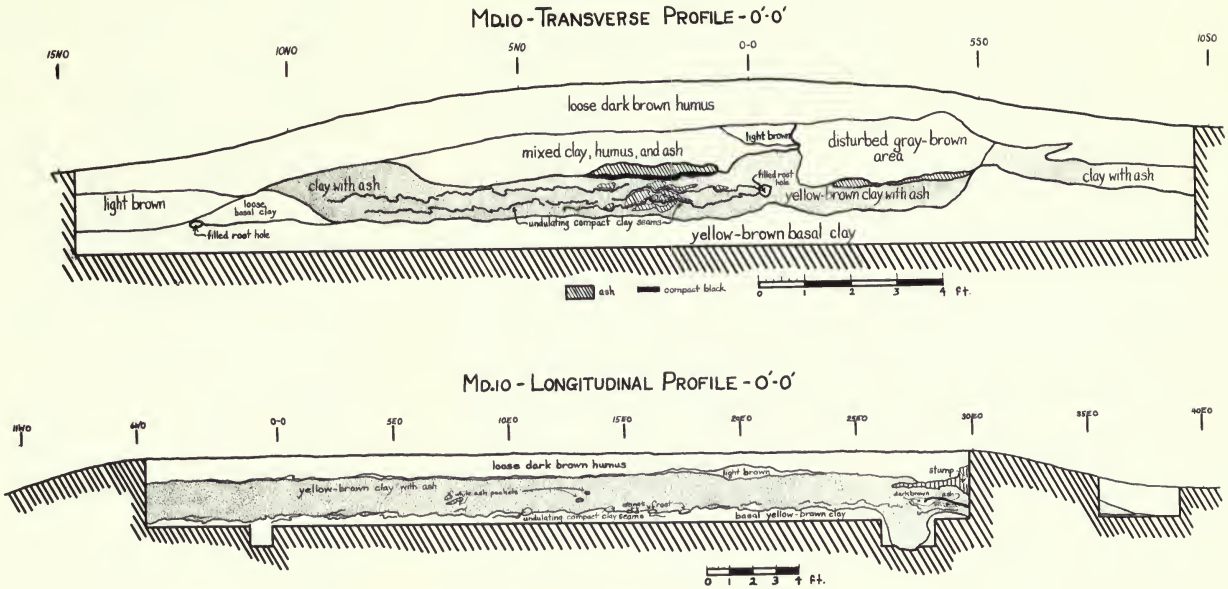

FIGURE 3

Mound 10 transverse and longitudinal profiles.

of the floor area were found a basin filled with ash and a trench containing the remains of a burial (see Fig. 2). The basin was apparently a fire pit in which ash was allowed to accumulate, although there was no evidence of fire-reddening of the underlying subsoil. The burial pit, which was excavated only in part, was unfortunately disturbed by intrusive animal burrowing and possibly some root disturbance. Within the pit was found part of a small child's skull cap and no other bones. The bone was relatively well preserved so that its fragmentary nature would seem to be due to either particular burial practices employed or disturbances following burial. Next to and east of the trench was a large point that was the only artifact that was directly associated with the mortuary activity in the mound (Fig. 6a). There were small ash pockets in the fill above the point.

The mound fill was composed of the following stratigraphic sequence: 1) At the base of the mound there was an accumulation of clay and pockets of ash. Some of the clay was packed in thin layers of about one-fourth inch thick that were contorted and discontinuous in distribution. The distinct ash pockets were separated from each other by fill. 2) On top of the layer of clay and ash was a large central ash bed that was separated from the underlying deposits by a compact black seam, possibly representing a prepared bed of humus. The surrounding clay was not discolored or fire-reddened, so that it must be concluded that any fires burnt in place were not very hot ones. In fact, the ash may actually be redeposited from a fire burnt in another location. The separate deposits of ash suggest a series of recurrent fires or depositional episodes, and as it will be seen below, it is a situation that is duplicated in Mound 18. 3) A layer of clay and ash mixed together mantled the primary mound fill and completed the mound.

Mound 18

This is a turtle effigy mound, of which only the center section was excavated (Figs. 4-5). The mound construction is divided into two units, namely, 1) the mound floor, and 2) the mound fill and its component phases. The mound floor was prepared by the removal of all humus so that the floor rested on very compact clay subsoil. The prepared area was covered with pebbles and numerous flint flakes, and it was positioned on a slight natural rise. In an excavation through the "tail" of the effigy, the prepared area was found to extend far into this extremity. Three burial pits were found in shallow, interconnected excavations into the prepared floor. In every case the pits extended outside the excavation unit so that the actual size of the burial area is not known. Evidently burials extend to the north, east, and west of the excavation (Fig. 5). There is no evidence that the burial pits were not made at the same time. The pits appeared to have been two connected trenches. One trench contained Burial 1, while the other contained Burials 2 and 3.

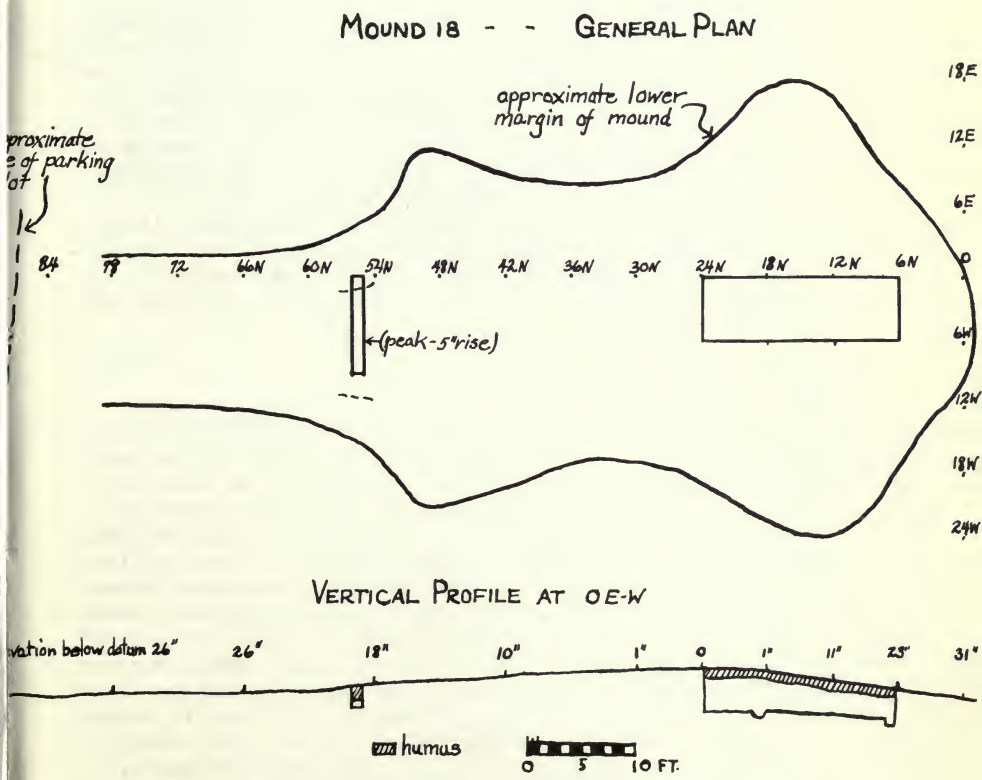

FIGURE 4

Drawing of Mound 18 showing plan and profile views.

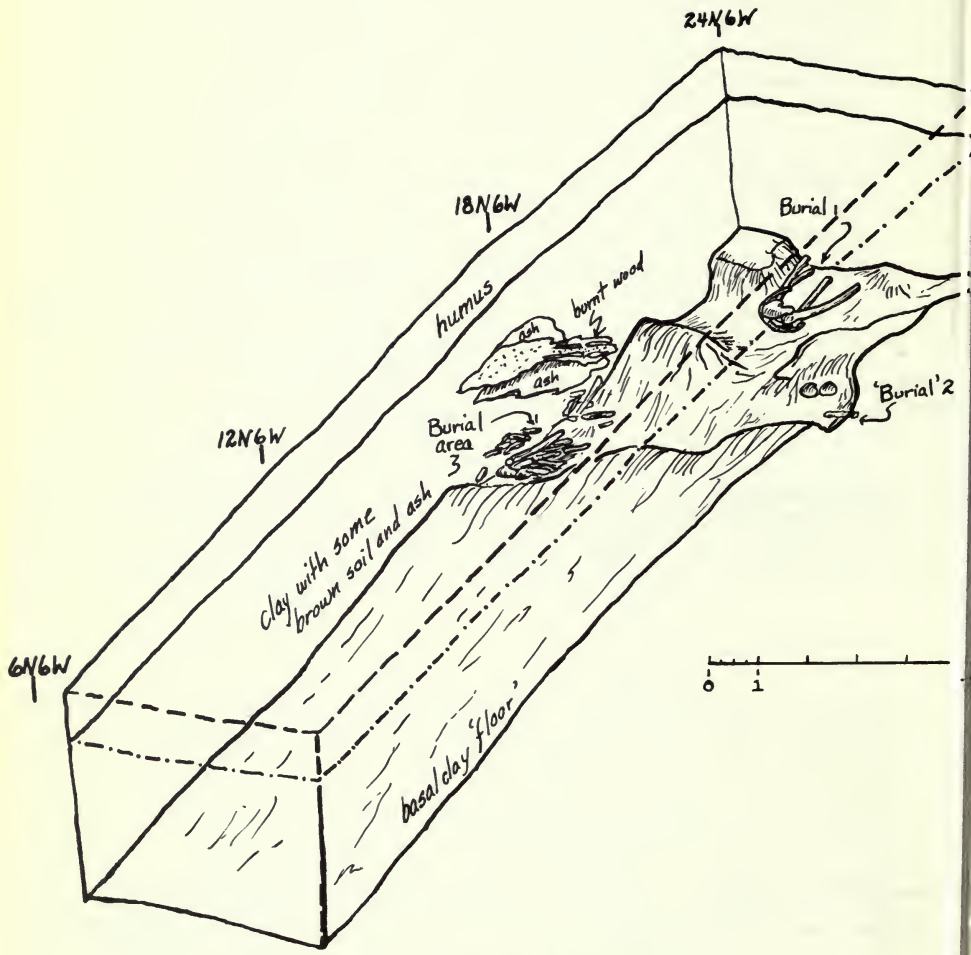

FIGURE 5

Isometric drawing of Mound 18 showing stratigraphy and feature locations.

Burial 1 consists of a single burial pile with only a few of the limb bones in correct anatomical position. The individual was male and between 25 and 35 years old. The arms, legs, feet and pelvis were well represented, but only part of the trunk was found. The skull was absent. Directly beneath one of the vertebra was found a projectile point with a broken tip and base (Fig. 6d). Over the west end of the pit was what appeared to be a clay cap. A cross-section revealed, however, that it was a section of the pit wall that had peeled away at the top and arched over the partly filled burial pit.

Burial 2 is represented by one bone fragment extending from the excavation wall and was not investigated further. Parts of the enclosing pit fill was composed of ash.

Burial 3 consists of loosely stacked burial piles representing probably two different individuals. The bones, consisting of limb bones and skull, were badly crushed and decayed.

The fill of Mound 18 was characterized by the same phases as Mound 10, namely: 1) an accumulation of a mixture of clay and ash, in which there is a succession of stratified ash deposits; 2) a larger fire overlying the previous fires; and 3) a terminal mantle of clay. The lowest ash clay layer around the central group of stratified ash deposits contained the same undulating compact clay layers as were found in Mound 10. The group of ash deposits contained at least five superimposed ash layers, and was located over Burial 3. Each bed of ash was usually clearly separated by a thin layer of clay. As in the case of Mound 10, the topmost fire differed from the underlying ash layers, but in contrast to Mound 10 the one from Mound 18 produced reddened clay beneath it and contained charcoal. This fire definitely burned in place and may have consumed different fuel.

Summary

Certain characteristics of mound construction are shared by the two mounds. Briefly, these similarities are: 1) removal of the humus and an inferred outlining of the intended mound shape as part of the initial burial procedure; 2) construction of subfloor burial pits; 3) a succession of ash deposits (as a result of fires?) in the center of the mound that terminate in a large deposit or fire; and 4) a mound mantle that covers the entire mound area and completes the mound. A comparison with other mounds in southern Wisconsin reveals that each of these elements are common although they are not always found together. The removal of all humus prior to the construction of the mound and presumably some degree of outlining is nearly universal among effigy mounds (Bennett 1945; Maxwell 1950:435; Rowe 1956:72). In most cases where the problem has been pursued with unambiguous results, humus removal also entails an outlining of the proposed mound (Bennett 1945; Barrett and Hawkes 1919). Maxwell (1950:435) has arrived at the same conclusion via another observation when he writes "the fact that burials

in animal-shaped mounds made at the site of what would be vital organs of the animals leads us to suspect that the mound was first traced out on the flat ground in a ceremony previous to the interment of the dead."

THE LAKE LAWN OCCUPATION SITE

In the Lake Lawn excavations artifacts were found in the humus of Mound 10 that can be legitimately connected with the occupation of the area as reported by C.E. Brown (1926). According to him:

> "the large number and character of the Indian earthworks at Lake Lawn clearly indicate that this was the site of an early important Indian village evidences of which are obscured beneath the present sod of the golf course, pasture and lawns of the resort. Indian implements are reported to have been recovered from this land in former years when these fields were under cultivation. A few scattered flint chips and burned stones were found in the pasture west of the hotel buildings during our visits in Lake Lawn" (Brown 1926:20).

Although Brown conceived of Lake Lawn as a large important village, the sparseness of artifacts and lack of more general occupation debris points to a different interpretation. The material that has been picked up and recovered to date could be the result of a specialized occupation over a long period of time (cf. Bennett 1945; Rowe 1956:51). It is probably not entirely irrelevant that in an analogous situation in central Illinois, over 200 feet of trenching in the Gooden mound site (of Maples Mills affiliation) only disclosed a fire pit, fire-broken rock, and infrequently occurring artifacts (Cole and Deuel 1937:193).

Since the humus was formed after mound construction, the materials in the humus are only accidentally connected with the original mound construction and must be regarded as unassociated with the mound itself. Although the humus is essentially a disturbed layer in which there are no certain associations between the artifacts, they are regarded here on the basis of typology as constituting an occupation connected with the makers of the mounds at Lake Lawn.

The aboriginal artifacts recovered from the humus of Mound 10 consist of two sherds and one hoe or mattock blade.

ARTIFACTS

Distribution

A total of eight aboriginal artifacts was found in

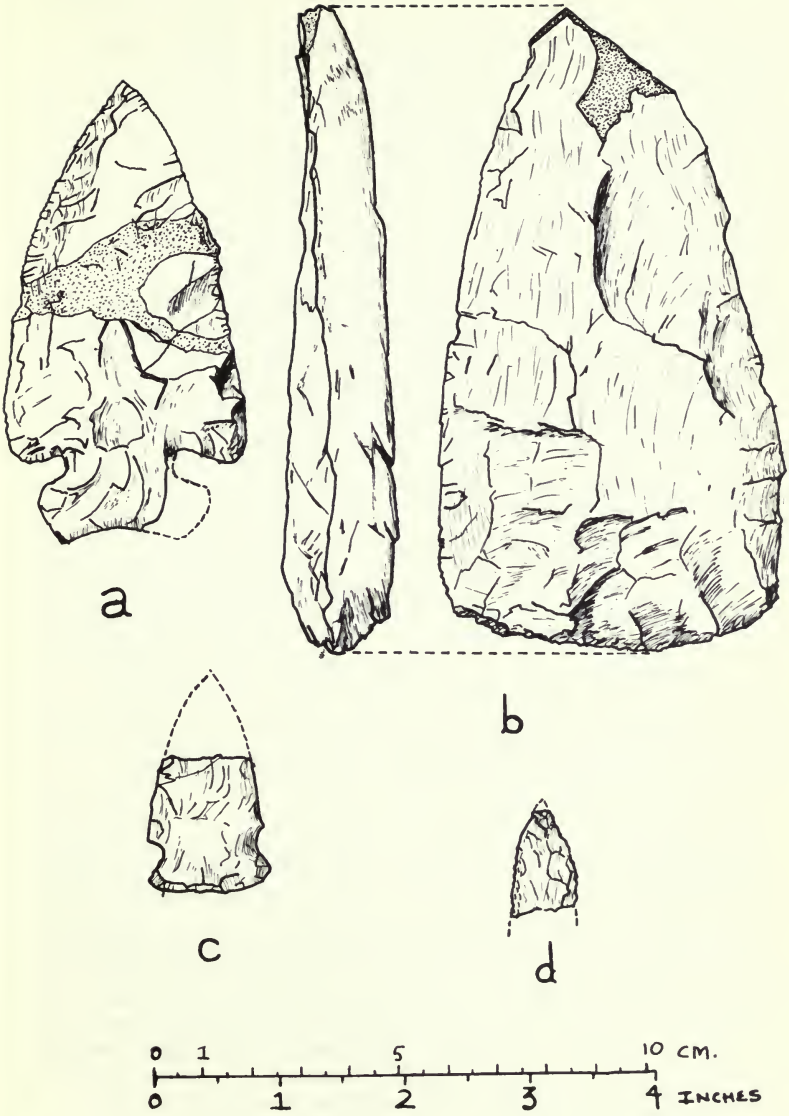

FIGURE 6

Stone artifacts from the Lake Lawn Mounds: a) Projectile point from Mound 10 floor, b) Mattock from Mound 10 humus, c) Projectile point base from Mound 10 fill, d) Projectile point (?) tip from Mound 18 fill.

the excavations. Six of them were found in Mound 10, and only three of these (2 points, 1 sherd) were directly connected with the mound. The other three (2 sherds, 1 mattock blade) were found in the surface humus. Only one artifact, a large point, was associated with the mound activity, i.e. on the floor. The remainder of the artifacts (1 sherd, 1 point fragment) were recovered from the fill of Mound 18.

Projectile Points (N=3)

The one artifact found on the floor of Mound 10 is an unusual point (Fig. 6a). It is a diagonally-notched and concave-based point made on an ovate blade. The blade above the haft has excurvate sides, and the notches, which are driven perpendicularly from the edges, are straight-sided. The basal and proximal edges are ground, and this grinding extends up to the maximum width which is above the notches. The notches appear to have been chipped after the grinding. The blade edges above the haft were rechipped with the result that the outline is slightly asymmetrical, the edges are finely serrated, and the left hand side is beveled. The cross-sections are asymmetrically bi-convex and approach being plano-convex. The material is a coarse, hetrogeneous flint. This point bears a resemblance to the Osceola point in the haft shape although the converging sides do not appear to be common in this type (see Ritzenthaler 1957:Pl.6). The ratio of length to breadth, however, is quite different. Bennett (1945:Pl.18.0) figures one of the few similar points known from the Effigy Mound area. The measurements of this point are listed below:

Total length:	9.3 cm.	Blade length	7.5 cm.
Maximum width:	4.8 cm.	Width at barbs:	4.5 cm.
Maximum thickness:	0.84 cm.	Base width (est):	2.4 cm.

The other point found in Mound 10 is a broken expanding stemmed point (Fig. 6c). The blade above the haft is ovate in outline and the base width is the maximum width of the point. The tang is asymmetrical and the shallow notch lacks secondary chipping. The base is slightly convex. One face of the point is not completely covered with chipping and the original flake surface is visible. This point can probably be referred to a series dominant in the early Late Woodland.

Total length:	Over 2.7 cm.	Tang length:	1.3 cm.
Maximum width (at base):	2.4 cm.	Blade width:	2.3 cm.

The point found in Mound 18 is a broken mid-section of an arrow point that cannot be further identified (Fig. 6d).

Mattock Blade (N=1)

The mattock or hoe blade (Fig. 6b) was found three inches below the sod at the foot of Mound 10 in the north end of the initial trench. The function of this piece is clearly indicated by the pattern of wear as well as its shape. Wear shows up on the chipped edges of the outer face which are slightly polished, and the bit edge which is faced with many hinge scars both large and small. It was evidently produced for this function since the tip has not been chipped to remove the cortex, and the upper half of the blade is triangular in transverse cross-section. Apparently this blade was hafted on the flat (inner) side to a handle that quite probably was a wooden elbow handle familiar among historic groups. The length is 13 cm.; the maximum width is 6.8 cm.; and the weight is 180 gm. The material is a glossy, mottled gray, coarse-textured stone that appears to be quartzite or silicified sandstone. A similar artifact appears in Late Woodland contexts. One was found in a linear mound in Jo Davies County, Illinois (Bennett 1945:Pl. 16f), and perhaps the specimen from Aztalan belongs here too, although this affiliation is not clear (Barrett 1933:Pl. 54). Others found in southern Wisconsin are without context (see Brown 1923). In Illinois they have been found in Late Woodland or Middle Woodland contexts (see Fowler 1952:159, Pl. xlix, a,b).

Pottery (N=4)

A total of four sherds was found, two of which from the humus of Mound 10 were very small. All of them are cordmarked and grit-tempered body sherds. The temper is composed of crushed igneous rock of different kinds. The indistinct cordmarking is relatively heavy. Thickness ranges from 0.65 to 0.75 cm. One sherd, from the fill of Mound 10, and another from the humus of the same mound, are very similar in having a compact gray paste. The other two are less similar to each other and have a redder and more friable paste. The affiliation of these sherds is most likely Late Woodland, although the more friable paste sherds could be Middle Woodland.

Note: This paper stands essentially as written in 1957 and it has not been updated to concord with the research that has been done since then.

ACKNOWLEDGMENTS

I would like to express my gratitude to the proprietors, Mr. and Mrs. Zilisch and Mr. Reader, for their willingness to provide room and board for the crew

members in addition to giving digging permission. I am also indebted to Dr. G. Kuiper, Dr. Van Bresbroeck, Dr. Ben Dor, Mr. Kenyon and members of the Walworth County Historical Society for their support and assistance in carrying out the excavations. The time given by the members of the Campus Archaeological Society in this excavation is greatly appreciated. Of these members, Dr. J. R. Caldwell was particularly helpful in supervising the dig into Mound 18, Miss E. Smith in developing the photographs, and Mr. J. Proust in identifying the human skeletal remains.

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THE BOOKSHELF

BOOK REVIEW

The Moccasin Bluff Site and the Woodland Cultures of Southwestern Michigan. Robert Louis Bettarel and Hale G. Smith. *University of Michigan, Museum of Anthropology, Anthropological Papers*, No. 49. Ann Arbor, 1973. iii, 209 pp. 21 Figures, 86 plates. No price given. (Paper).

The Moccasin Bluff site, located in the Saint Joseph River valley of southwestern Michigan near the town of Buchanan, has figured prominently in discussions of Great Lakes archeology since J. B. Griffin identified the site and its materials as the McCartney focus (Griffin 1946: Fig. 7). As is, unfortunately, too often the case in archeology, this discussion has proceeded without benefit of a definitive report of the materials obtained from the site by amateur archeologists and by Hale G. Smith's excavations in behalf of the University of Michigan Museum of Anthropology in 1948. Now at last such a report exists. It is most welcome.

Although Hale G. Smith and Robert Louis Bettarel are listed as co-authors, this book is a revision of Bettarel's doctoral thesis. Those of us who are interested in the archeology of the Upper Great Lakes owe a debt of gratitude to the Museum of Anthropology of the University of Michigan for making available to a larger public in its by now well-known series of "Anthropological Papers" the results of doctoral research conducted under its aegis. Mr. Smith's name has been added as co-author in recognition of his role as director of the 1948 excavations at Moccasin Bluff.

The purpose of this book is stated very clearly by Bettarel:

> "This report is an attempt to collect the currently available data and present an account of the late prehistoric groups in southwestern Michigan.
>
> "The core of material used in the study is the archeological data from the Moccasin Bluff site. . .
>
> "A secondary interest is to examine the subsistence base of the prehistoric societies and to investigate the nature of the relationship between the human population and other species in the eco-system" (Bettarel 1973:1).

Basically the book is a site report. Most of its pages are devoted to the job of describing and analyzing the artifacts and features found at Moccasin Bluff. The organization is traditional. There are brief chapters

describing the natural environment of the site and the 1948 excavations. These are followed by four chapters describing and analyzing the features and artifacts. These chapters are followed in turn by a comparative study of the Moccasin Bluff materials that attempts to give them a chronological and cultural context. The concluding portion of the book features discussions of the subsistence economy and the ethnographic identity of the proto- and early historic occupants of the site.

To appreciate fully this report we need to keep in mind the obstacles Bettarel had to surmount. As any field archeologist knows, interpreting one's own excavations is quite hard enough, but trying to describe and interpret excavations conducted some twenty years ago using someone else's notes and records without the advantage of first-hand observation is another matter altogether. Over a twenty-year period memories, records, and the artifacts all tend to suffer a good deal of attrition.

A second obstacle faced by this study stems from the nature of the excavations. Today's theoretical concerns are inevitably different from those of 1948. There has also been progress, we trust, in the methodology and technology of archeological digs. This report gives us a valuable illustration of the impossibility of divorcing techniques of data collection from the kinds of questions being asked of a site. It is often impossible to go back and ask today's questions of yesterday's digs. For instance, many of the questions archeologists are asking of their sites today center on problems of "cultural ecology." Bettarel is aware of this and poses as one of his objectives the examination of the subsistence base of Moccasin Bluff's human population and the relationship of that human population to other species in the eco-system. This report certainly makes some valuable contributions to this end, but these contributions are less than they might have been because of the way the site was dug.

The best ecological information in this report was obtained from the bone analysis. Most of the bone recovered in 1948 was identified shortly thereafter, but only in terms of the species present or absent and either has not been re-analyzed or is not available for re-analysis. Fortunately, bone from eight "refuse pits" was analyzed by Charles Cleland using quantitative techniques and has been previously published (1966:211). Anyone interested in the Moccasin Bluff site should look at Cleland's discussion of the bone sample as well as Bettarel's comments on Cleland's analysis. However, the sample studied by Cleland did not come from the 1948 excavations, but rather from a collection donated by an amateur archeologist and thus cannot be certainly associated with any particular component at the site.

Bettarel's analysis of cultural ecology is also limited by the lack of evidence concerning plant use. Excavation techniques were not geared to the recovery of plant material in 1948; hence, the paucity of such materials cannot be taken as proof of their relative unimportance to the peoples of Moccasin Bluff. Although some corn was found in "corn holes" or "smudge pits" (Binford 1967) and is described and analyzed by Richard I. Ford in a valuable appendix in this book, the relative importance of horticulture and gathering as economic activities remains unknown.

A third major obstacle faced by Bettarel was the lack of stratigraphy. The types of artifacts found at Moccasin Bluff demonstrate the multi-component nature of the site. Artifacts of Archaic and Early, Middle, and Late Woodland types have been found either in the excavated portion of the site or in the near vicinity. Except in the pits, however, the various components were thoroughly mixed. Under these circumstances, even with a properly designed strategy for digging, it is virtually impossible to detail the spatial relationships of artifacts of any one component at a given point in time. This just about closes and locks the door on any attempt at interpreting patterns of human behavior at the site as reflected in horizontal patterns of artifact distribution (cf. Brose 1970).

Under these circumstances it is hard enough to define successfully even gross artifact assemblages. This, in fact, is the major and very important contribution of this study. Bettarel defines several ceramic assemblages. These are the basis for the formal presentation of three new Late Woodland phases: The Brems phase (A.D. 500-1050), the Moccasin Bluff phase (A.D. 1050-1300) and the Berrien phase (A.D. 1400-1600). He does this using 1) the "classic" typological method (throwing artifacts in a big pile on the table, then sorting them into little piles of similar "types"), 2) the limited internal evidence available from the site (variability in the contents of the pits), and 3) comparative evidence from other sites in the area. It should be emphasized that these "phases" are almost exclusively ceramic phases. Bettarel was unable to define assemblages for other kinds of artifacts.

Out of all of this comes a perspective on culture history in southwestern Michigan which gives strong emphasis to cultural continuity. Bettarel sees evidence for continuity between Early and Middle Woodland ceramics with Havana ware sherds overlapping Marion Thick sherds in all attributes except interior cord-marking. He also sees a continuous development from Middle Woodland pottery to the early Late Woodland pottery of his Brems phase, followed by a smooth transition into pottery types characteristic of the Moccasin Bluff phase. It is only in the latest occupations that signs of discontinuity are detected with three distinct series of pottery present at the site, according to Bettarel. A shell-tempered, plain-

surfaced pottery similar to "Huber Culture" ceramics is interpreted as the pottery of the prehistoric Miami. Vessels characterized by grit temper and scalloped rims are interpreted as the remains of a Central Algonkian group, either the Kickagoo, Sauk, Mascouten, or Potowatomi. And finally, a series of sherds with notched applique-strip decoration is seen as the remains of groups driven by the Iroquois from the Cleveland, Ohio, region where similar pottery has been found.

Since the analysis of Late Woodland pottery is this report's most important contribution, it might be appropriate to raise a couple of minor questions regarding facets of the analysis. These questions probably do not affect the validity of the basic conclusions of the study, but they might affect the validity of comparisons made by archeologists seeking to evaluate their findings in the light of the Moccasin Bluff data.

I am convinced of the value of using vessels as the analytical units in ceramic studies. But I wonder if archeologists' notions of which rims can be lumped as coming from one vessel don't vary considerably. In this study the minimum number of vessels is approximately eighty per cent of the total number of rim sherds. My own figures for minimum number of vessels obtained during the analysis of several thousand rims from some twelve sites in Minnesota have been consistently more conservative, averaging between fifty and sixty per cent of the total number of rims. McPherron's figures in the Juntunen site report seem even more conservative. A quick check based on about one-half of his sample shows a ratio of vessels to rims of only .45 (McPherron 1967:102-118). One wonders if Bettarel's minimum number of vessels is really a minimum.

I was interested by the repeated occurrence of the phrase, "cord-marking was mixed and variable," or its equivalent (pp. 54, 55, 60, 61). After examining the photographs in the appendix, I was impressed once again that the description of a surface as "cord-marked" may often cover a multitude of sins! If possible, we need to sharpen our discriminatory abilities when it comes to interpreting surface treatment of Woodland pottery. We may be missing an important source of variability.

One of the really helpful features of this report is the wealth of photographs. There are eighty-six plates of photographs in the appendix. The value of the photographs of rims is enhanced by the practice of including profile drawings of the same rims on the facing pages. It was dismaying to find that the profiles cannot always be matched with rims in the photographs. Often the number of profile drawings does not match the number of rims in the photographs, and there is no numbering system to co-ordinate profiles and rims.

The profiles pose another problem. After seeing the many "nickel-sized" sherds for which profiles are offered, I am led to doubt the accuracy of some of the profile

stances. This in turn could affect the validity of the description of the range of vessel shapes present in the various pottery groups. Determining the stance of small rim fragments of the relatively crude Woodland pottery is always difficult at best. Much of the Moccasin Bluff Woodland pottery would seem to pose even greater difficulties than usual since it often features modified and possibly distorted lips.

These are relatively minor problems. Also minor are the numerous typographical and grammatical "glitches." These do not affect the substance of the report and are a small price to pay for the privilege of having research of this sort made accessible to the general public.

Bettarel indubitably is aware of the traditional nature of his research. Perhaps I am reading too much between the lines, but to me his closing statement has an almost wistful ring, as if apologies were in order for not being able to tackle the more *avant garde* issues of culture "process."

> "The report has defined and outlined a portion of the culture history of one small area. . . but even more interesting are the underlying processes which determined the outline of that history . . . . It is to an understanding of these processes that more of our future efforts should be devoted" (p. 154).

I do not think there is a need for apologies. Granted that it is more exciting to formulate a research strategy in the light of current problem orientation, dig one's own site and find new materials; granted that it is frustrating to accept the limitations imposed by stale collections and dated excavation strategies; still, it is vital that important materials like those from Moccasin Bluff be definitively described and analyzed. Despite the limitations, the results of this study are substantial. Bettarel has done us a real service.

Edward Lugenbeal
Andrews University
Berrien Springs, Michigan

The Indian Mounds at Albany, Illinois. Elaine Bluhm Herold (editor), with an Appendix by Paul L. Jamison. *Davenport Museum Anthropological Papers*, No. 1. 1971. 164 pp. 44 figures. $2.50 (Paper).

With this volume, the Davenport Museum (originally, the Davenport Academy of Natural Sciences) introduces a brand new series of monographs devoted to anthropology. If this handsome publication fairly portends the future, all those seriously interested in anthropological problems within the Midwest will eagerly await future papers in the series.

Basically, this paper is a conventional site report of excavations into the Albany mounds by Davenport Museum personnel. These excavations were conducted between 1873 and 1879 and again from 1906 until 1908. A variety of people supervised these excavations, including museum sponsored field trips to the site, with W. H. Pratt, J. H. Paarmann, and W. B. Nickerson being the most important. Some brief reports of a preliminary nature were published on this work, mainly in the *Proceedings of the Davenport Academy of Natural Sciences*, but until the present publication, a true appreciation for what this important site has produced could only be attained by studying unpublished manuscripts at the museum and by examining the museum's artifact collections one's self. Thankfully, Dr. Bluhm has done this for us, so that now for the first time a detailed report on the Albany site is available to the general public.

The Albany site is one of the largest assignable to the Hopewell phase of the Middle Woodland (or Burial Mound 2) period in the state of Illinois. It consisted (at least in 1907) of 81 conical burial mounds associated with at least three major village areas strung out along the rolling bluffs above the Mississippi River in Whiteside County in northeastern Illinois.

A description of excavations in the mounds, 25 in all, comprises the bulk of the report. Taking her information from published reports and from unpublished field notes and manuscripts, Bluhm describes each of the 25 excavated mounds, proceeding in the numerical order by which the mounds have come to be designated. Original maps and cross-sections available for ten of the mounds have been redrawn and are included, along with a number of original photographs, to supplement the descriptions of the mounds. In characteristic Hopewell fashion, most of the mounds had a central area carefully prepared for multiple extended and/or bundle burials. Prior to mound construction, the burials had either been laid out on the ground surface after it had been cleared of topsoil or, more commonly, had been placed in a subsoil pit lined with stones and/or with logs.

Of course, by modern standards of field work, the excavations and note taking of these early archaeologists leaves much to be desired. One has the impression that their work was primarily grave oriented, which meant that the contents of the mound fills were largely ignored. This view is supported by photographs (Figures 19 and 24) that show the use of horse drawn scrapers to cut trenches through at least two mounds (presumably to get rapidly to the subsoil burial pits that underlay most of the mounds), by the relative care with which the burials and their associated grave goods are reported in marked contrast to other artifacts for which provenience within the mound is not recorded, and by the extreme paucity of artifacts of any kind outside of the tombs. Considering that only 68 potsherds are reported from all 25 mounds and only 175 chipped stone

artifacts (70 of which were associated with burials), it seems highly likely that a great deal of data contained in the general mound fill was not collected.

Following the chapter describing the mounds and the excavations in them, a chapter of 31 pages is devoted to describing the 1,073 artifacts recovered. Actually, the above total is somewhat misleading since 774 of these artifacts are shell beads and pearls. This leaves only 299 other artifacts from the 25 mounds. Included in this latter total, besides the 175 chipped stone tools and the 68 potsherds mentioned previously, are eight artifacts of ground stone, 18 of bone, and six of metal (including conjoined tubes of sheet silver), plus 15 pieces of exotic minerals (i.e., crystals, galena, and mica), four marine shell containers, and five whole or restorable ceramic vessels. With the exception of a few of the potsherds and a single bannerstone (which was a surface find), the entire artifact inventory is characteristically Hopewellian. As Hopewell sites go, however, the Albany mounds must be regarded as somewhat impoverished, for the total number of distinctive and/or exotic cermonial mortuary items is small as most of the burials had few or no grave goods. This situation prompted Bluhm to suggest ". . . that perhaps there might not have been a dominant elite at Albany who controlled the religious life of the community as has been suggested for Ohio and elsewhere. . ." (p. 105).

In addition to the more or less conventional archaeological side of the report there is a single page listing of vertebrate species (unquantified) identified by Paul W. Parmalee from faunal material provided him from the site and a comprehensive chapter (billed as Appendix I) reporting Paul L. Jamison's detailed analysis of the human skeletal material recovered from the mounds. Of particular interest in Parmalee's list of species is the inclusion of *Bison bison*, a rare occurrence in Woodland sites in the eastern United States. It is to be lamented that the provenience of these important elements was not provided although it is likely that no such data are available.

Jamison's contribution is, I think, a significant one. His analysis is based upon a series of 221 individuals collected from 13 of the mounds. Following standard physical anthropological procedures, he aged and sexed all individuals where the evidence warranted it and then constructed a mortality profile for the population that was compared with similar data from Indian Knoll and Dickson Mound. In a more speculative vein Jamison then attempts to estimate the total number of skeletons contained in the entire site as the basis for ascertaining what the population of the site might have been at any moment during the site's existence. Assuming a duration of site occupancy of 500 years (He provides data for assumed periods of occupancy in 100 year intervals from 100 to 500 years, but

apparently prefers 500 years because that figure had been employed earlier by others in estimating the Indian Knoll population size.), he estimates that the Albany population would have been between 60 and 100 individuals at any one time (p. 124). This, of course, is a frankly speculative exercise and must be accepted on that basis. It is interesting to note the ramifications of this line of reasoning, for the resulting population estimate is similar to that previously obtained for the Indian Knoll site of Archaic age in Kentucky. Assuming that these speculative conclusions are reasonably accurate, Jamison has been lead to suggest that the generally accepted population expansion of Hopewell times may have been the result of an increase in village numbers rather than in village size, a proposition that is certainly testable against the archaeological record. Finally, using statistics for size distance, shape distance, and generalized distance, he attempts a comparative analysis of metrical data from the Albany skulls with a number of other skeletal populations throughout the Midwest. The interesting conclusion of this analysis is that the Albany people closely resemble Hopewellian peoples in Ohio and Missouri, while they are notably dissimilar from Early and Late Woodland and Mississippian peoples elsewhere in the Midwest.

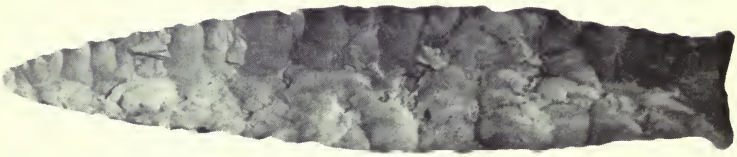
The description and publication of someone else's excavated materials is a trying and thankless task, but one that needs to be done or else important data will languish in boxes and on shelves forever. With the exception of portions of Jamison's analysis, there is nothing particularly imaginative or innovative about this report, but that is understandable considering the nature of the data. Basically, it is a purely descriptive report about a body of archaeological data that was gathered in the late 19th and early 20th centuries. It is, nonetheless, an extremely useful report, especially for people interested in Illinois archaeology. In addition, students of Wisconsin archaeology will find this report particularly relevant, for the Albany mounds close the spatial gap considerably between the Hopewellian sites of the Illinois River valley and those of Trempealeau County in western Wisconsin.

James B. Stoltman
Department of Anthropology
University of Wisconsin-
Madison

BOOK NOTICE

Two Leggings: The Making of a Crow Warrior. Peter Nabokov. Thomas Y. Crowell Company, Appollo Editions. New York, 1967. 226 pp. 2 maps and 27 photographs $2.25 (Paper).

This book reports the life story of Two Leggings, a Crow warrior who was born about 1851 and who died in 1923, having lived most of his life on the northern Great Plains. William Wildschut, an ethnographer, recorded Two Leggings' reminiscences between 1919 and 1923, but for various reasons, his 480 page manuscript remained unpublished in the archives of the Museum of the American Indian, Heye Foundation, until Peter Nabokov took an interest in it in 1962. Nabokov has shortened the original manuscript, written an introduction to the book, and provided short introductions to each of the chapters. The story that Two Leggings has to tell is hardly spectacular, for even among his own people, he was regarded as but a minor leader. Nor is there anything really new either historically or ethnographically in his account. The book's value and fascination comes from the insights it gives us of what the thoughts, and everyday experiences were of an "average" Crow warrior in the late nineteenth century. There were many Crow men and women whose life stories we would no doubt rather read, but these stories, unfortunately, will never be written. As a result, Two Leggings' story is unique, and in this respect makes for interesting reading.



PROJECTILE POINT OF THE SCOTTSBLUFF EARED VARIETY

Black basalt; heavily patinated on one side; length 4 1/8", width 13/16", thickness 3/16". Surface find near Hayward, Sawyer County, at the end of the Chippewa flowage by Jim Borkenhagen of Milwaukee.

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